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PORTABLE ENTERTAINMENT APPARATUS

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(A1) A portable entertainment apparatus capable of communicating with a digital entertainment server is provided. The digital entertainment server is operable to store video content, and the portable entertainment apparatus is operable to store at least part of the video content stored in the digital entertainment server. The portable entertainment apparatus may include (i) a communications interface for downloading video content from the digital entertainment server in digital format, (ii) a storage module for storing the downloaded video content; and (iii) a controller coupled to and operable to control the operations of the communications interface and the storage module.; The controller is operable to control the communication interface so as to download to the portable entertainment apparatus at least part of the video content stored in the digital entertainment server responsive to the portable entertainment apparatus establishing a communication with the digital entertainment server.

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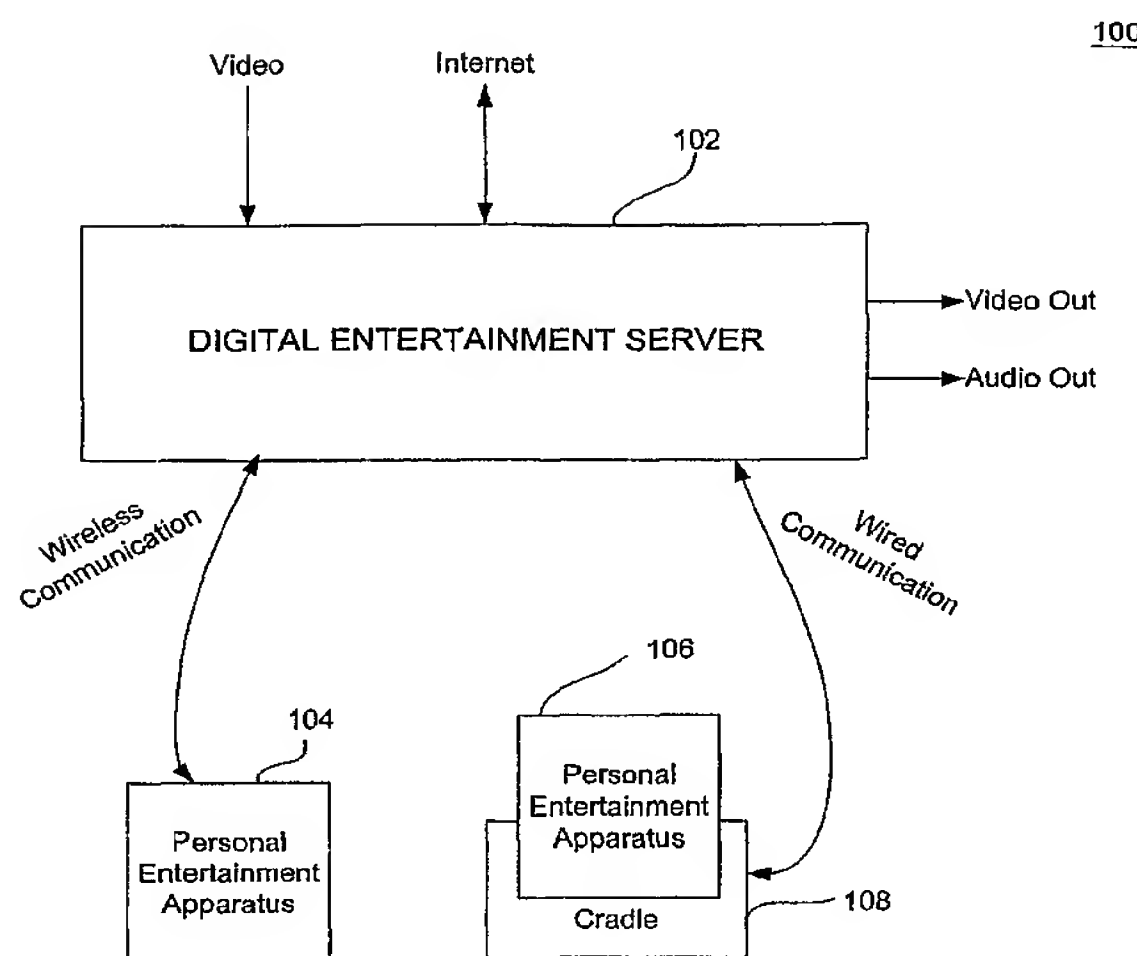
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(57) Abstract: A portable entertainment apparatus capable of communicating with a digital entertainment server is provided. The digital entertainment server is operable to store video content, and the portable entertainment apparatus is operable to store at least part of the video content stored in the digital entertainment server. The portable entertainment apparatus may include (i) a communications interface for downloading video content from the digital entertainment server in digital format, (ii) a storage module for storing the downloaded video content; and (iii) a controller coupled to and operable to control the operations of the communications interface and the storage module. The controller is operable to control the communication interface so as to download to the portable entertainment apparatus at least part of the video content stored in the digital entertainment server responsive to the portable entertainment apparatus establishing a communication with the digital entertainment server.

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PORTABLE ENTERTAINMENT APPARATUS

REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of U.S. Provisional Patent App. Ser. No. 60/499,948, filed September 3, 2003, entitled "Portable Entertainment Apparatus," the
5 entirety of which is incorporated herein by reference.

BACKGROUND

Field

The present invention relates generally to entertainment systems, and more specifically, to a portable entertainment apparatus that is used in conjunction with digital
10 entertainment systems, such as digital video recorders or personal video recorders.

Related Art

Digital entertainment systems, such as digital video recorders (DVRs) (otherwise know as personal video recorders (PVRs) and digital video disc (DVD) players, have received increased attention lately and have become popular. These digital entertainment systems
15 are capable of reproducing video and audio content at a high quality as compared to conventional analog entertainment systems because the video and audio content may be digitally formatted. Digitally formatting video content also facilitates implementation of program guides, and manipulation of the video content by users.

Conventional DVRs typically receive video content either from a conventional video
20 cable or through broadband connection, and then encode and store the received video content in compressed digital formats, such as motion-pictures-experts-group standard 2

("MPEG-2"), for future retrieval by a user. In this manner, users are able to view high quality video content at any desired time without deterioration of image quality as compared with analog recording of video content. One example of a conventional DVR is the ReplayTV brand of DVR's provided by Digital Networks North America headquartered in Santa Clara,
5 California.

One of the disadvantages of conventional DVRs is that they typically do not have a separate display, and thus, require a separate display system, such as a television set or computer monitor, to view recorded video content. In addition, the typical size of conventional DVR's is too large to be portable.

10 DVR users, however, may find it very useful and convenient if they could download at least part of the video content stored in the DVR to a portable entertainment apparatus, and enjoy the video content at a location remote from the DVR. For example, a user may desire to download a movie stored in a DVR to a portable entertainment apparatus, and then view the movie while traveling, just as one listens to music using a car audio system in conjunction
15 with a portable MPEG Audio Layer 3 ("MP3") player or portable CD player.

Moreover, a user may desire to update the video content on portable entertainment apparatus with video content and DVR so that the video content does not become stale. In other words, a user may desire to synchronize the video content stored in the portable entertainment apparatus with that in the DVR at any of number of intervals, e.g., (i) once a
20 day, (ii) once a week, (iii) after the video content on the portable entertainment apparatus has been viewed, and (iv) etc.

Therefore, there is a need for a personal entertainment apparatus that is portable and is operable to store at least a practical amount of video content, for example, one hour of

video content, in digital format. There is also a need for a personal entertainment apparatus that can download video content from a conventional DVR. Furthermore, there is a need for synchronizing the video content stored in a portable entertainment apparatus with that of a DVR.

SUMMARY

A portable entertainment apparatus that operates in conjunction with a digital entertainment server storing entertainment content, such as video and audio content, in digital format is provided. The portable entertainment apparatus, which may be embodied as
5 a handheld device, may download the entertainment content from the digital entertainment server. According to one embodiment, the portable entertainment apparatus may store at least one hour of video content in digital format in a storage device, such as a disk-based storage medium, which is integrated into, integral to or otherwise incorporated into the portable entertainment apparatus. The entertainment content stored in the digital
10 entertainment server and the portable entertainment apparatus may be synchronized after the portable entertainment apparatus establishes a communication link with the digital entertainment server.

By way of example, the digital entertainment server may be operable to store video content, and the portable entertainment apparatus may be operable to store at least part of
15 the video content stored in the digital entertainment server. The portable entertainment apparatus may include (i) a communications interface for downloading video content from the digital entertainment server in digital format, (ii) a storage module for storing the downloaded video content; and (iii) a controller coupled to and operable to control the operations of the communications interface and the storage module. The controller is operable to control the
20 communication interface so as to download to the portable entertainment apparatus at least part of the video content stored in the digital entertainment server responsive to the portable entertainment apparatus establishing a communication with the digital entertainment server.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments are described with reference to the following drawings, wherein like reference numerals refer to like elements in the various figures, and wherein:

FIG. 1 is a first block diagram illustrating a digital entertainment system in accordance with an exemplary embodiment;

FIG. 2 is a second block diagram illustrating a digital entertainment server in accordance with an exemplary embodiment;

FIGS. 3A-3D are third–sixth block diagrams each illustrating a personal entertainment apparatus in accordance with an exemplary embodiment;

FIG. 4 is a seventh block diagram illustrating couplings between elements of the personal entertainment apparatuses described in FIGS. 3A-3D.

FIGS. 5A-5D are first–fourth flowcharts each illustrating a flow for synchronizing a digital entertainment server and a personal entertainment apparatus in accordance with an exemplary embodiment;

FIGS. 6A-6B are a eighth and ninth block diagrams illustrating portable entertainment apparatuses in accordance with exemplary embodiments; and

FIG 7 is a tenth block diagram illustrating a portable entertainment apparatus for playing video content in accordance with an exemplary embodiment.

DETAILED DESCRIPTION

Exemplary Architecture

FIG. 1 is a diagram illustrating a digital entertainment system 100 including a digital entertainment server and alternative embodiments of a personal entertainment apparatus in accordance with an exemplary embodiment. Referring to FIG. 1, the digital entertainment system 100 includes a digital entertainment server 102 and one or more personal entertainment apparatuses 104, 106.

The digital entertainment server 102 may be embodied as a digital video recorder ("DVR"). As such, it may output video and audio to conventional displays and speakers, respectively. The digital entertainment server 102, however, may also include a communication interface for communicating with the personal entertainment apparatuses 104, 106. In addition, the digital entertainment server 102 may employ a control mechanism for synchronizing the entertainment content stored therein with the entertainment content stored in the personal entertainment apparatuses 104, 106. Exemplary embodiments as described below with reference to FIGS. 5A, 5B, 5C, and 5D.

The digital entertainment server 102 may receive digital entertainment content, including video content, from various conventional interfaces, including a coaxial Radio Frequency ("RF") Antenna, and S-Video interface, network interfaces, and the like (not shown). In addition, the digital entertainment server 102 may be capable of connecting to a data communications network, such as the Internet, to download entertainment content and upload information to a remote server (not shown).

The personal entertainment apparatuses 104, 106 are portable and/or handheld devices that are adapted to process video and audio content. The personal entertainment

apparatuses 104, 106 are client devices in relation to the digital entertainment server 102. In other words, responsive to a request, the digital entertainment server 102 may download digital entertainment content, such as video content, to the personal entertainment apparatus 104 via a communications interface. This communications interface may be, for example, a
5 wireless interface, such as an RF interface, a Bluetooth interface, a cellular communication interface, and the like.

In another embodiment, the personal entertainment apparatus 106 is placed on a cradle 108 connected to or directly coupled via a cable (not shown) to a wired communication network. In such case, the digital entertainment server 102 may download
10 digital entertainment content, such as video content to the personal entertainment apparatus 106 via the wired communication network and the cradle 108 or cable (not shown).

The cradle 108 may have a button (not shown) that, when pressed, initiates a sequence for synchronizing the digital entertainment content stored in the digital entertainment server 102 and the personal entertainment apparatus 106. Once stored in the
15 personal entertainment apparatuses 104, 106, the personal entertainment apparatuses 104, 106 is then operable to play the downloaded digital entertainment content.

The personal entertainment apparatuses 104, 106 may be handheld and portable so that they can be (i) carried anywhere with the downloaded video content stored therein and (ii) then capable of playing the downloaded video content anywhere at a location remote from
20 the digital entertainment server 102. Furthermore, the video content stored in the personal entertainment apparatuses 104, 106 may be synchronized with the video content stored in the digital entertainment server 102 whenever communicatively coupled to the communications network via the communications interface.

As such, when new entertainment content is stored in the digital entertainment server 102, the personal entertainment apparatuses 104, 106 may be operable to detect the presence of the new entertainment content, and responsively download at least part of the new entertainment content. The new entertainment content may be downloaded in
5 accordance with user preferences as described in more detail below.

FIG. 2 is a block diagram illustrating the digital entertainment server 102 in accordance with an exemplary embodiment. The digital entertainment server 102 may include an input module 202, input switches 203, an encoder 204, a memory 206, a controller 208, a data storage medium 210, a back-end communications interface 212, a
10 transcoder 214, a front-end communications interface 216, and an output module 218.

For ease of understanding, the digital entertainment server 102 is shown coupled to a TV 220, a monitor 222, a speaker 224, and the personal entertainment apparatus 104. The digital entertainment server 102 may also have a power source (not shown) for providing power to its components. The power source can be a conventional battery, a rechargeable
15 battery, or any other type of power source.

The input module 202 may receive input video content through various conventional interfaces, including coaxial RF antennas, an S-Video interface, and the like. The received video signals may originate from standard NTSC broadcast, high definition television (HDTV) broadcast, standard cable, satellite, home video (e.g., VHS) and/or other sources. The input
20 module 202 may also receive input from other devices, such as a set top box that receives one signal format and outputs an NTSC signal or other video format. The input module 202 is configured to include appropriate tuning functionality as well.

The video content received by the input module 202, which may be in the form video signals, may be passed to the encoder 204. The encoder 204 may then convert video signals from a first format (e.g., analog NTSC, VHS, S-Video, or other conventional format) to a digital format (e.g., MPEG-2). The digital video data may be then stored under control of
5 the controller 208 in the storage medium 210 for future retrieval.

The storage medium 210 may be any type of rewritable memory capable of storing digital data, and is typically a hard disk, an optical disk such as rewritable DVD (DVD-RW) or rewritable DC (CD-RW), flash memory, or the like. Although various capacities of the storage medium 210 may be provided ranging from a few minutes to hundreds of hours, the storage
10 medium 210 may typically store at least one hour of video content in digital format. Roughly, for each gigabyte of storage, about 1 hour of video content may be stored at standard image quality using MPEG-2.

Video content stored in the storage medium 210 may be viewed immediately or at a later time. Additional information such as program guide data, title of the video content, and
15 the like may be stored in association with the stored video content to identify and manage the stored video content in the storage medium 210.

The digital entertainment server 102 may also be connected to a data communication network, such as the Internet, via the back-end communications interface 212. The back-end communications interface 212 may be a standard or proprietary network
20 interface that allows connection to an Ethernet-based network. This back-end communications interface 212 may also be used to connect to a home network, a broadband network, or any other data network.

The digital entertainment server 102 may download various entertainment content such as video, audio, game, and the like in digital format through the back-end communication interface 212 from various content sources on the data communication network. Content received through the back-end communication interface 212 may already
5 in digital format such as MPEG-2, and thus, the controller 208 may cause the content to be stored in the storage medium 210 without processing by the encoder 204.

In addition, the digital entertainment server 102 can transmit data to a remote server (not shown) on the data communication network through the back-end communications interface 212. For example, pay-per-view content selection information, request of specific
10 entertainment content, credit card payment information, or any other type of information used by the digital entertainment server 102 may be transmitted via the back-end communication interface 212 to the remote server.

The controller 208 controls the operation of the various elements in the digital entertainment server, including the input module 202, the encoder 204, the memory 206,
15 the back-end communications interface 212, the storage medium 210, the transcoder 214, the front-end communications interface 216, and the output module 218. To facilitate this, the controller may be embodied as, for example, a general purpose computing platform, a specialized computing platform, a Linux or other open source computing platform, a proprietary computing platform, and the like.

20 Accordingly, the processing system 110 includes at least one processor that is operable to execute general and proprietary logic. To this end, the controller 208 executes instructions or programs stored in the memory 206 to provide various functionalities of the

digital entertainment server 102, such as synchronizing the digital entertainment content stored in the digital entertainment server 102 and the personal entertainment apparatus 104.

The memory 106 operates as a working memory for the controller 108 when the controller executes instructions and programs and may store additional instructions, such as boot-up sequences and/or other information. The memory 206 may be just about any type of storage media, including for example, a rewritable memory such as an SRAM and/or read-only memory such as ROMs.

The output module 218 includes a video decoder 226 and an audio decoder 228. The video and the audio decoders 226, 228 may be decoders that convert the digital video and digital audio content stored in the storage medium 210 into a format compatible with conventional display devices, such as an NTSC format television set 220 or a computer monitor 222, and with conventional speakers 224 (e.g., MPEG decoders).

The digital entertainment server 102 also communicates with a personal entertainment apparatus 104 as described in FIG. 1 via the front-end communications interface 216. Using the front-end communications interface 216, the digital entertainment server 102 may transmit entertainment content stored in the storage medium 210 to the personal entertainment apparatus 104. The digital entertainment server 102 may also receive data or other information, such as a wish list of entertainment content, or various control signals from the personal entertainment apparatus 104. The front-end communications interface 216 may be a wireless communication interface, such as cellular modem, a Bluetooth interface, satellite communication interface or RF communication interface, and the like.

Alternatively, the entertainment content can be downloaded to a personal entertainment apparatus 106 with wired communication capabilities as described above. In such case, the front-end communications interface 216 may be a wired communication interface, such as a modem that can be connected to a regular telephone line, an RS-232C interface, a standard USB port, and IEEE 1394 connection (otherwise known as FireWire, I.Link, or Lynx) and the like. In addition, the digital entertainment server 102 may be connected to a personal entertainment apparatus 106 with wired communication capabilities, rather than a personal entertainment apparatus 104 with wireless communication capabilities.

The entertainment content stored in the storage medium 210 may be downloaded to the personal entertainment apparatus 104 in digital format without decoding. This may prevent any distortion of the entertainment content.

The transcoder 214 is capable of modifying the encoding rate of the digital entertainment content under control of the controller 208. This may be done prior to downloading to the personal entertainment apparatus 104, and by sampling the digital entertainment content at a predetermined sampling rate. The predetermined sampling rate may be selected by a user of the digital entertainment server 102 or the personal entertainment apparatus 104. In one embodiment, the encoding rate is selected by the user of the digital entertainment server 102 by using the input keys 203.

The encoding rate may be selected by the user of the personal entertainment server 104 by using input switches (not shown), and the selected encoding rate may be communicated to the controller 208 via the front-end communications interface 216. The controller 208 may also control the transcoder 214 according to the selected encoding rate.

In this manner, users can choose to compromise the quality of the downloaded entertainment content in exchange for reduced data size, and thus, increase an amount of downloadable entertainment content.

Referring now to FIG. 3A, a block diagram illustrating a personal entertainment
5 apparatus according to one embodiment is shown. The personal entertainment apparatus 104 may operate in conjunction with the digital entertainment server 102 as described above and illustrated in FIG. 2.

The personal entertainment apparatus 104 includes a communications interface 302,
input switches 304, a controller 306, a storage medium 308, a memory 310, an output
10 module 312, a display 314, and a speaker 316. The personal entertainment apparatus 104 may also have a power source (not shown) for providing power to its components. The power source can be a conventional battery, a rechargeable battery, or any other type of power source.

The personal entertainment apparatus 104 may allow a user to beneficially enjoy the
15 entertainment content stored therein at a location remote from the digital entertainment server 102, e.g., in a hotel room or in a car, with proper connection to the display device 314 and/or the speaker 316. Alternatively, the personal entertainment apparatus 104 can operate without the need for connection to any external display device or speaker, when the display 314 and speaker 316 are integrated into, integral to or otherwise incorporated in the
20 personal entertainment apparatus 104.

In this embodiment, the personal entertainment apparatus 104 may be operable to download entertainment content from the digital entertainment server 102 via the communications interface 302 using wireless communications. As such, the communications

interface 302 may be a wireless communication interface, such as cellular modem, a Bluetooth interface, satellite communication interface, an RF communication interface, and the like.

The downloaded video and audio content is in digital form, and may be stored in the storage medium 308 for immediate or future retrieval. The storage medium 308 may be any type of rewritable memory capable of storing digital data, such as a flash memory, a hard disk, an optical disk such as rewritable DVD (DVD-RW) or rewritable DC (DC-RW), or any other rewritable data storage means. Although various capacities of the storage medium 308 may be provided ranging from a few minutes to hundreds of hours, the storage medium 308 may typically store at least one hour of video content in digital format. Additional information such as program guide data, title of the video content, and the like may be stored in the storage medium 308 in association with the stored video content to manage and identify the stored video content.

In addition, the personal entertainment apparatus 104 can also transmit data to the digital entertainment server 102 via the communication interface 302. For example, it is possible to transmit a wish list of entertainment content, a user-selected encoding rate, a user-selected interval for synchronization of content between the digital entertainment server 102 and the personal entertainment apparatus 104, or any other type of data, from the personal entertainment apparatus 104 to the digital entertainment server 102.

The input switches 304 provide a way for a user to control the personal entertainment apparatus 104. The input switches 304 include, but are not limited to, a play button, a stop button, a menu button, and enter (select) button, a forward button, a rewind button, a power on/off button, a standby mode button, and the like. The input switches 304

may also include a button to input the encoding rate selected by the user for the transcoder 214 in the digital entertainment server 102. The input commands generated by the input switches 304 are provided to the controller 306 so that the controller 306 controls the operation of the personal entertainment apparatus 104 in response to the input commands.

5 Some of the input commands may also be transmitted to the digital entertainment server 102 via the communications interface 302.

The controller 306 receives the various input commands from the input switches 304 and also executes instructions or programs stored in the memory 310 to control the various elements in the personal entertainment apparatus 104, including the communications
10 interface 302, the input switches 204, the storage medium 308, the memory 310, the output module 32, the display 314, and the speaker 316. The memory 310 operates as a working memory for the controller 306 when the controller executes instructions and programs and may also store additional instructions, such as boot-up sequences and/or other information. The memory 310 may be embodied as a rewritable memory, such as an
15 SRAM, but can also include read-only memory.

The output module 312 includes a video decoder 318 and an audio decoder 320. The video decoder 318 and the audio decoder 320 are decoders that convert the digital video and digital audio content stored in the storage medium 308, and encode, in a digital format, into a format compatible with a conventional display device 314 and with a
20 conventional speaker 316 (e.g., an MPEG decoder). The display device 314 can be a liquid crystal display (LCD), a computer monitor, a conventional television set and/or any other display device.

The entertainment content stored in the digital entertainment server 102 may be synchronized in various ways with the entertainment content stored in the personal entertainment apparatus 104. As such, the personal entertainment apparatus 104 is operable to download at least part of the entertainment content from the digital entertainment server 102 after it is within synchronization range for communicating with the digital entertainment server 102. The method of synchronizing the stored entertainment content is describe in more detail below with reference to FIGS. 4, 5A, 5B, 5C, and 5D.

The entertainment content stored in the storage medium 308 may be deleted when the user has previously viewed and/or listened to the entertainment content, although other embodiments may still store the entertainment content even after the user has used the entertainment content. For example, the entertainment content may be deleted from the storage medium 308 after a predetermined time, e.g., 10 minutes, 1 hour, or 10 hours, after the entertainment content has been used. Alternatively, the entertainment content may be deleted from the storage medium when the entertainment content is used a predetermined number of instances, e.g., once, twice, or the like.

FIG. 3B is a block diagram illustrating a personal entertainment apparatus 106 according to another exemplary embodiment. The personal entertainment apparatus 106 is similar to the personal entertainment apparatus 104 shown in FIG. 3A in most aspects, except that the personal entertainment apparatus 106 in FIG. 3B has wired communication capabilities. Accordingly, the communications interface 302 may be embodied as a wired communication interface such as a standard modem that can be connected to a telephone line, a RS-232C interface, a standard USB port, an IEEE 1394 connection (otherwise known as FireWire, i.Link, or Lynx) and the like.

FIG 3C is another block diagram illustrating a personal entertainment apparatus 105 in accordance with another exemplary embodiment. In this embodiment, the personal entertainment apparatus 105 is similar to the personal entertainment apparatus 104 shown in FIG. 3A in most aspects, except that the personal entertainment apparatus 104 in FIG. 3C
5 does not include an integrated display device and/or speaker, but rather, the display device 314 and speaker 316 are external to the personal entertainment apparatus 105.

In this case, the video and audio decoders 318, 320 output video and audio content, respectively, in a format compatible with display 314 and speakers 316, respectively. As such, the personal entertainment apparatus 104 may be compatible with any type of
10 conventional display or speaker, including, for example, a car video display or car audio speaker.

When embodied as a portable device, the users of the personal entertainment apparatus 105 can enjoy video or audio content at any location remote from the digital entertainment server 102. For example, a user can (i) download movies from the digital
15 entertainment server 102 to the personal entertainment apparatus 105, (ii) take it to any location, and (iii) then enjoy the movies stored in the personal entertainment apparatus 105 by connecting it to an external device having a display and speaker.

FIG. 3D is a block diagram illustrating a personal entertainment apparatus 107 in accordance with another exemplary embodiment. As shown in FIG. 3D, the personal
20 entertainment apparatus 107 is similar to the personal entertainment apparatus 106 shown in FIG. 3B, except that the personal entertainment apparatus 107 in FIG. 3D does not include does not include an integrated display device and/or speaker, but rather, the display device 314 and speaker 316 are external to the personal entertainment apparatus 105.

In this case, the video and audio decoders 318, 320 output video and audio content, respectively, in a format compatible with display 314 and speakers 316, respectively. As such, the personal entertainment apparatus 104 may be compatible with any type of conventional display or speaker, including, for example, a car video display or car audio
5 speaker.

FIG. 4 is a block diagram of a coupling between elements of the personal entertainment apparatuses 104-107 described in FIGS. 3A-3D. The elements of the personal entertainment apparatuses shown in FIG. 4 include the communications interface 302, the controller 306, the memory 310, the display 314, and the input switches 304. For
10 simplicity, the personal entertainment apparatuses 104-107 are referred to collectively as personal entertainment apparatus 104 in reference to FIG. 4.

Referring now to FIG. 4, the memory 310 may store a wish list 402 and a played list 406 of entertainment content. The wish list 402 is typically a list of entertainment content that the user of the personal entertainment apparatus 104 wishes to download from the
15 digital entertainment server 102 after the entertainment content becomes available at the digital entertainment server 102. For example, the wish list 402 can store title a list of movies that the user is interested in. Alternatively, the wish list 402 can store a list of music, game content or any other type of entertainment content that the user wishes to download from the digital entertainment server 102.

20 The played list 406 typically stores a list of entertainment content that has already been used by the user of the portable entertainment apparatus 104. In addition, the played list 406 and the wish list 402 are typically mutually exclusive, i.e., the entertainment content on the played list 406 is not listed on the wish list 402. This may be accomplished by the

controller 306 executing software preventing entertainment content listed on the played list 406 from being added to the wish list 402.

According to another embodiment, the played list 406 and the wish list 402 can overlap. That is, entertainment content on the played list 406 can also be on the wish list 402.

The memory 206 of the digital entertainment server 102 may also maintain an available-content list 404. This available-content list 404 may be a list of entertainment content that is stored in the storage medium 210 of the digital entertainment server 102. This content may be indexed by its title, type or any other identifying information. The available entertainment content may include video (movies), audio (music), game content, and the like.

The digital entertainment server 102 and the personal entertainment apparatus 104 may synchronize their stored entertainment content using the available-content list 404, the wish list 402, and the played list 406. The available-content list 404 may be transmitted from the digital entertainment server 102 to the personal entertainment apparatus 104 via the communication interface 302 at the request of the controller 306, for instance. Alternatively, the available-content list 404 may be transmitted automatically at a predetermined interval to the personal entertainment apparatus 102. The received available-content list 404 may also be stored in the memory 310 temporarily for use by the personal entertainment apparatus 104 for synchronization of entertainment content.

As an alternative, the entertainment content on both the available-content list 404 and the wish list 402 may be given a priority for downloading to the personal entertainment apparatus 104. In addition, the entertainment content on both the available-content list 404

and the wish list 402 may be downloaded. The controller 306, however, may be configured to prevent entertainment content on the played list 406 from being downloaded to the personal entertainment apparatus 104.

In addition, the user of the personal entertainment apparatus 102 can choose entertainment content that he or she would like to download from the digital entertainment server 102 after looking at the available-content list 404. To facilitate this, the controller 306 may display the available-content list 404 received from the digital entertainment server 102 on the display 314 by executing graphical user interface (not shown) stored in the memory 310. Using the display 314 as a reference, the user can select entertainment content that he or she wants to download from the available-content list 404 by using the input switches 304.

Exemplary Operation

FIG. 5A is a flowchart illustrating a flow 500 for synchronizing a digital entertainment server and a personal entertainment apparatus in accordance with an exemplary embodiment. Flow 500 includes a number of functions for determining whether or not a synchronization of entertainment content between the digital entertainment server 102 and a personal entertainment apparatus, such personal entertainment apparatus 104, should be performed. The functions of the flow 500 may be performed by the digital entertainment server 102 or the personal entertainment apparatus 104.

Referring now to the Flow 500 at decision block 522, a first test is performed to determine if new entertainment content is available in the available-content list 404. If no new entertainment content is available, a second test is performed to determine whether the passage of time since the most recent synchronization exceeded a synchronization interval,

as shown in decision block 554. The synchronization interval can be predetermined or be set by a user. If the passage of time did not exceed the synchronization interval, then a test is performed to determine, as shown in decision block 556, whether a synchronization was initiated manually by a user. If not, the process returns to step 552 to determine whether
5 synchronization is necessary.

On the other hand, a "yes" result from any of the decision blocks 552, 554, and 556, cause the Flow 500 to transition to decision block 558. At decision block 558, a test is performed to determine whether the personal entertainment apparatus is within synchronization range for communicating with the digital entertainment server 102. If not,
10 then the process returns to step 552. If storage is available, then entertainment content may be synchronized between the digital entertainment server 102 and the personal entertainment apparatus 104 in accordance with a synchronization method as described below, or any other synchronization method.

FIG. 5B is a flowchart illustrating a Flow 560 for synchronizing a digital entertainment
15 server and a personal entertainment apparatus in accordance with an exemplary embodiment. Flow 560 includes a number of functions for determining whether or not a synchronization of entertainment content between the digital entertainment server 102 and a personal entertainment apparatus, such as personal entertainment apparatus 104, should be performed. The functions of the flow 560 may be performed by the digital entertainment
20 server 102 or the personal entertainment apparatus 104.

In this embodiment, the entertainment content may be automatically synchronized according to the wish list 402 and the available-content list 404 when the personal entertainment apparatus 104 is within synchronization range for communicating with digital

entertainment server 102. Entertainment content that has already been played is not to be downloaded to the personal entertainment apparatus 104. Flow 560 is described in reference to the architecture illustrated in FIG. 4.

At decision block 502, the personal entertainment apparatus 104 performs a test to
5 determine whether or not it is within synchronization range for communicating with the digital entertainment server 102. If the personal entertainment apparatus 104 is within synchronization range of the digital entertainment server 102, then a wireless or wired communication link can be established between the digital entertainment server 102 and the personal entertainment apparatus 104 via the communication interface 302. The process of
10 determining whether or not a wired or wireless communication link has been established is well-known in the art.

The personal entertainment apparatus 104 may continually or periodically monitor the communication link to determine if it is not within synchronization range. For example, the personal entertainment apparatus 104 may check the communication link at a predetermined
15 interval, e.g., ever 10 minutes, every hour, or every 24 hours.

When the personal entertainment apparatus 104 is within synchronization range, then the digital entertainment server 102 receives the wish list 402 and the played list 406 from the personal entertainment apparatus 104, as shown in block 504. The received wish list 404 and the played list 406 may be temporarily stored in the memory 206 of the digital
20 entertainment server 102. Then, the wish list 402 may be compared 506 with the available-content list 404 to identify entertainment content available on both lists.

As shown in decision block 508, the digital entertainment server 102 may also check whether or not the identified entertainment content on both the wish list 402 and the

available-content list 404 is on the played list 406 as well. This function may be optional and may be removed from the process, if desired. If the identified entertainment content on both the wish list 402 and the available-content list 404 is also on the played list 406, then the Flow 560 ends, as shown in block 514.

5 If, on the other hand, the identified entertainment content on both the wish list 402 and the available-content list 404 is not on the played-list, then all the identified entertainment content may be downloaded 510 to the personal entertainment apparatus 104, as shown in block 510. At block 512, the downloaded entertainment content may be deleted from the wish list 402. The flow then ends as shown in block 514.

10 Referring now to FIG. 5C, a flowchart illustrating a Flow 562 for synchronizing a digital entertainment server and a personal entertainment apparatus in accordance with an exemplary embodiment is shown. Flow 562 includes a number of functions for determining whether or not a synchronization of entertainment content between the digital entertainment server 102 and a personal entertainment apparatus, such personal entertainment apparatus
15 104, should be performed. The functions of the flow 562 may be performed by the digital entertainment server 102 or may be performed by the personal entertainment apparatus 104.

 In this embodiment, the entertainment content is synchronized automatically when the personal entertainment apparatus is within synchronization range from the digital
20 entertainment server 102 according to a user selection at the personal entertainment apparatus 104 of the entertainment content on the available-content list 404. Flow 562 is described in reference to the architecture illustrated in FIG. 4.

Referring to decision block 520, the personal entertainment apparatus 104 performs a test to determine whether or not it is within synchronization range of the digital entertainment server 102, as described above in reference to FIG. 5B. When the personal entertainment apparatus 104 is within synchronization range for communicating with the digital entertainment server 102, it then receives the available-content list 404. The available-content list 404 may be temporarily stored in the memory 310 and displayed on the display 314, as shown in block 522. Then, the personal entertainment apparatus 104 may receive a user-selection of entertainment content from available-content list 404 using the input switches 304, as shown in block 524. The entertainment content may be downloaded to the personal entertainment apparatus 104 from digital entertainment server 102 according to the user selection, as shown in block 526. At block 527, the Flow 562 ends.

FIG. 5D is a flowchart illustrating a Flow 564 for synchronizing a digital entertainment server and a personal entertainment apparatus in accordance with an exemplary embodiment is shown. Flow 564 includes a number of functions for determining whether or not a synchronization of entertainment content between the digital entertainment server 102 and a personal entertainment apparatus, such personal entertainment apparatus 104, should be performed. The functions of the flow 564 may be performed by the digital entertainment server 102 or the personal entertainment apparatus 104.

In this embodiment, the entertainment content is synchronized automatically when the personal entertainment apparatus is within synchronization range for communicating with the digital entertainment server 102 in accordance with a user selection at the digital entertainment server 102. Referring now to block 530, the digital entertainment server 102 may receive a user selection of entertainment content to be downloaded to the personal

entertainment apparatus 104. The user selection may be stored in the memory 206 of the digital entertainment server 102, as shown in block 532. Sometime thereafter, the personal entertainment apparatus 104 performs a test to determine whether or not it is within synchronization range for communicating with the digital entertainment server 102, as
5 described above with reference to FIG. 5A and shown in decision block 534.

When the personal entertainment apparatus 104 is within synchronization range, , then entertainment content is downloaded from the digital entertainment server 102 to the personal entertainment apparatus 104 according to the user selection stored in the digital entertainment server 102, as shown in block 536. At block 537, the Flow 564 ends.

10 **Alternative Architecture**

FIG. 6A is a block diagram illustrating a portable entertainment apparatus 600 in accordance with an exemplary embodiment. The portable entertainment apparatus 600 may operate in conjunction with an external device 620 to (i) receive input commands from a user, (ii) display video content, and (iii) play audio content. The external device 620 can be any
15 type of device that provides input switches 624, a display 622, a speaker 628, and a communication interface 626. For example, a conventional car video system that has input switches, a liquid crystal display, and a speaker will suffice as the external device 620 when it is configured to operate in conjunction with the portable entertainment apparatus 600.

The portable entertainment apparatus 600 may include a communication interface
20 602, a controller 604, a memory 606, a decoder module 608, and a storage module 610. The portable entertainment apparatus 600 may also have a power source (not shown) for providing power to its components. The power source can be a conventional battery, a rechargeable battery, or any other type of power source. The portable entertainment

apparatus 600 shown in FIG. 6A is similar to the personal entertainment apparatus 104 of FIGS. 3A and 3B.

Referring now to Fig. 6A, the storage module 610 is operable to store video content and associated audio content. The storage module 610 may be any type of rewritable
5 memory capable of storing digital data. For example, the storage module 610 may be a flash memory, a hard disk, or an optical disk such as rewritable DVD (DVD-RW) or rewritable CD (CD-RW), or any other rewritable data storage means. Although various capacities of the storage medium 610 may be provided ranging from a few minutes to hundreds of hours, the storage medium 610 typically stores at least one hour of video content in digital format.
10 Additional information such as program guide data, title of the video content, and the like may be stored in the storage medium 610 in association with the stored video content to manage and identify the stored video content. The video content stored in the storage module 610 may be downloaded from a digital entertainment server (not shown).

The decoder module 608 decodes the video and associated audio data stored in the
15 storage module 610 from a digital format, such as MPEG-2, to an analog format that is compatible with the conventional display 622 and the conventional speaker 628 of the external device 620. The decoded video and audio content is provided to the external device via the communication interfaces 602, 626. The communication interfaces 602, 626 may be deployed as any type of conventional video and audio communication interfaces, such as
20 component video, composite video, S-video, conventional audio cables, and the like.

The input switches 624 on the external device 628 provide an interface to the user to control the portable entertainment apparatus 600. The input switches 304 include, but are not limited to, a play button, a stop button, a menu button, an enter (select) button, a forward

button, a rewind button, a power on/off button, a standby mode button, and the like. The input control signals generated by the input switches are provided to the controller 604 via the communication interfaces 602, 626 to control the operation of the portable entertainment apparatus 600.

5 The controller 604 may receive various input control signals from the input switches 624 of the external device 620. Responsively, the controller 604 may execute instructions or programs stored in the memory 606 so as to control the various elements in the portable entertainment apparatus 600, including the communications interface 602, the storage module 610, the memory 606, and the decoder module 608.

10 The memory 606 may operate as a working memory for the controller 604 when the controller executes instructions and programs, and may also store additional instructions, such as boot-up sequences or other information. The memory 606 is typically a rewritable memory such as an SRAM, but can also include read-only memory such as ROMs.

 Since the portable entertainment apparatus 600 receives input commands from the
15 external device 620 and provides decoded video and audio content stored therein to the external device 620, the portable entertainment apparatus 600 can be readily integrated to an external conventional video/audio device such as a car video/audio system typically having input switches, a liquid crystal display, and a speaker.

 FIG. 6B is a block diagram illustrating a portable entertainment apparatus 650 and an
20 external device 670 in accordance with another exemplary embodiment. The portable entertainment apparatus 650 includes a communications interface 652, a controller 654, a memory 656, a decoder module 658, a storage module 660, a display 662, and a speaker

664. The external device 670 includes input switches 672 and a communications interface 674.

The portable entertainment apparatus 650 also has a power source (not shown) for providing power to its components. The power source can be a convention battery, a rechargeable battery, or any other type of power source. The portable entertainment apparatus 650 may operate in conjunction with the external device 670 to receive input commands from a user by using the input switches. Each of the elements of the portable entertainment apparatus 650 and an external device 670 are similar to the previously described embodiments, and therefore, are not included here for the sake of simplicity.

FIG. 7 is a block diagram illustrating a portable entertainment apparatus 700 for playing video content in accordance with yet another exemplary embodiment. The portable entertainment apparatus 700 includes a dedicated video communications interface 702 used only for video communication, an encoder module 704, input switches 706, a storage module 708, a processor module 710, a decoder module 712, a memory module 714, a speaker 718, and a display module 716. The portable entertainment apparatus 700 also has a housing (not shown) enclosing these elements, except that the input switches 706, the display module 716, and the speaker 718 are located on the exterior surface of the housing. The elements of the portable entertainment apparatus 700 may be integrated into, integral to or otherwise incorporated within the single housing of the portable entertainment apparatus 700 (not shown).

The dedicated video communications interface 702 is a communications interface dedicated to receiving video content 718 and other data associated with the video content (such as title, caption data, etc.) from any source (not shown) of video content. The video

communication interface 702 can be any type of wired or wireless communication interface as long as it is dedicated to reception of video content, and data associated with the video content. For example, the video communication interface 702 can be an RF coaxial cable, S-video interface, component video interface, composite video interface, a standard modem
5 connection to a regular telephone line, RS-232C interface, a standard USB connection, a IEEE 1394 connection (otherwise known as FireWire, i.Link, or Lynx), a cellular communication interface, Bluetooth interface, satellite communication interface, RF communication interface, or the like.

The encoder module 704 encodes the received video content 718 to a digital format
10 such as MPEG. If the received video content 704 is already in digital format, then the encoder module 704 might not encode the video content again.

The encoded video content is stored in the storage module 708 in digital format. The storage module 708 may be any type of rewritable memory capable of storing digital data such as flash memory, hard disk, rewritable DVD (DVD-RW), rewritable CD (CD-RW), or
15 any other rewritable data storage means.

The decoder module 712 includes both a video decoder and an audio decoder, and may carry out decoding of the encoded video content and associated audio content to a format compatible with conventional display devices, such as a liquid crystal display and/or conventional speakers.

20 The display module 716 is operable to display the decoded video content and may be any type of conventional display device, which may be, for example, a liquid crystal display, a plasma display panel, and the like. The speaker 718 may be a conventional speaker that is operable to reproduce the decoded audio content.

The input switches 710, which may be located on the exterior surface of the housing (not shown), may be used for inputting commands to the portable entertainment apparatus 700. The input switches 706 may include basic buttons for playing the video content, like a play button for playing video content, a stop button for stopping playing video content, and a menu button for displaying a list of video content stored in the storage module 708. The input switches 706 may also include other switches corresponding to various functions for controlling the portable entertainment apparatus 700. For example, the input switches 706 may include a navigation button for moving through the list of video content, and a select button for selecting one of the video content from the list. The function of the navigation button and the select button can also be provided by the basic buttons such as the menu button and the play button by providing an alternative operational state to the those basic buttons.

The processor module 710 may receive input commands from the input switches 706, and also control the video communications interface 702, the encoder module 704, the storage module 708, the decoder module 712, the display module 716, the speaker 718, and the memory module 714 according to the received input commands. The memory module 714 typically operates as a working memory for the processor module 710 when the processor module 710 executes instructions and programs. The memory module 714 may also store additional instructions, such as boot-up sequences and/or other information. The memory module 714 is typically a rewritable memory such as an SRAM, but can also include read-only memory such as ROMs. In addition, the memory module 714 may maintain graphical user interface software for controlling the operation of the portable entertainment apparatus 700. When executed by the processor module 710, the graphical user interface

software is operable to display on the display module 716 in response to activation of the menu button of the input switches 706 a list of video content stored in the storage module 708.

The processor module 710 may cause the decoder module 712 to decode at least
5 part of the video content stored in the storage module 708 and cause the display module 716 to display the decoded video content in response to activation of the play button. The processor module 710 may also cause the display module to stop displaying the decoded video content in response to activation of the stop button.

The portable entertainment apparatus 700 preferably operates with a rechargeable
10 battery power source (not shown), but can also be used with other conventional power sources. The rechargeable battery is a conventional Lithium Ion or NiMH rechargeable battery.

Conclusion

In the foregoing detailed description, numerous specific details are set forth in order
15 to provide a thorough understanding of exemplary embodiments described herein. However, it will be understood that these embodiments may be practiced without the specific details. In other instances, well-known methods, procedures, components, and structural entities have not been described in detail, so as not to obscure the foregoing description.

In view of the wide variety of embodiments to which the principles of the present
20 invention can be applied, it should be understood that the illustrated embodiments are exemplary only, and should not be taken as limiting the scope of the present invention. In the embodiments described above, the nodes, terminal, devices, and systems may include computing systems, controllers, and other devices containing processors. These devices

may contain at least one Central Processing Unit ("CPU") and a memory. In accordance with the practices of persons skilled in the art of computer programming, reference to acts and symbolic representations of operations or instructions may be performed by the various CPUs and memories. Such acts and operations or instructions may be referred to as being
5 "executed," "computer executed" or "CPU executed."

One of ordinary skill in the art will appreciate that the acts and symbolically represented operations or instructions include the manipulation of electrical signals by the CPU. An electrical system represents data bits that can cause a resulting transformation or reduction of the electrical signals and the maintenance of data bits at memory locations in a
10 memory system to thereby reconfigured or otherwise alter the CPU's operation, as well as other processing of signals. The memory locations where data bits are maintained are physical locations that have particular electrical, magnetic, optical, or organic properties corresponding to or representative of the data bits. It should be understood that the exemplary embodiments are not limited to the above-mentioned platforms or CPUs and that
15 other platforms and CPUs may support the described methods.

The data bits may also be maintained on a computer readable medium including magnetic disks, optical disks, and any other volatile (e.g., Random Access Memory ("RAM")) or non-volatile (e.g., Read-Only Memory ("ROM")) mass storage system readable by the CPU. The computer readable medium may include cooperating or interconnected computer
20 readable medium, which exist exclusively on the processing system or are distributed among multiple interconnected processing systems that may be local or remote to the processing system.

Furthermore, the method steps described herein may be taken in sequences other than those described, and more or fewer elements may be used in the block diagrams. The embodiments disclosed are for exemplary purposes only and other embodiments may be employed in lieu of or in combination with of the embodiments disclosed. Further, the claims
5 should not be read as limited to the described order or elements unless stated to that effect. Therefore, all embodiments that come within the scope and spirit of the following claims and equivalents thereto are claimed as the invention.

CLAIMS

What is claimed is:

1. A handheld, portable entertainment apparatus comprising:

5 a disk-based storage media integrated to the handheld, wherein the disk-based storage media is operable to store at least one hour of video content encoded in digital format;

a decoder module for decoding the video content stored in the disk-based storage media; and

a display for displaying the decoded video content.

- 10 2. The handheld, portable entertainment apparatus of claim 2, further comprising a communications interface for receiving the video content from a video content source.

3. A portable entertainment apparatus capable of communicating with a digital entertainment server, wherein the digital entertainment server is operable to store video content, and wherein the portable entertainment apparatus is operable to storing at least part
15 of the video content stored in the digital entertainment server, the portable entertainment apparatus comprising:

a communications interface for downloading video content from the digital entertainment server in digital format;

a storage module for storing the downloaded video content; and

- 20 a controller coupled to and operable to control the operations of the communications interface and the storage module, wherein the controller is operable

to control the communication interface to download to the portable entertainment apparatus at least part of the video content stored in the digital entertainment server after the portable entertainment apparatus established a communication with the digital entertainment server.

5 4. The portable entertainment apparatus of claim 3, wherein the communications interface is a wireless communication interface connecting the portable entertainment apparatus to the digital entertainment server via a wireless communication network, and wherein at least part of the video content stored in the digital entertainment server is downloaded to the portable entertainment apparatus via the wireless communication network
10 when the portable entertainment apparatus is within a wireless communication range for communicating with the digital entertainment server.

5. The portable entertainment apparatus of claim 3, wherein the portable entertainment apparatus communicates with the digital entertainment server via a cradle and a cable connecting the cradle to the digital entertainment server, and wherein at least part of the
15 video content stored in the digital entertainment sever is downloaded to the portable entertainment apparatus via the cable and the cradle when the portable entertainment apparatus is coupled to the cradle.

6. The portable entertainment apparatus of claim 3, wherein the digital entertainment server provides to the portable entertainment device an available-content list listing video
20 content available for downloading, and wherein the video content from the video content listed is selected from the digital entertainment server.

7. A portable entertainment apparatus capable of communicating with a digital entertainment server, wherein the digital entertainment server is operable to store video content, and wherein the portable entertainment apparatus is operable to store at least part of the video content stored in the digital entertainment server, the portable entertainment
5 apparatus comprising:

a communications interface for downloading video content from the digital entertainment server in digital format;

a storage module for storing the downloaded video content;

a memory storing a wish list of video content; and

10 a controller coupled to and operable to control the operations of the communications interface, the memory, and the storage module, wherein the controller is operable to control the communication interface to download from the digital entertainment server video content on the wish list after the portable entertainment apparatus established as communication with the digital entertainment
15 server.

8. The portable entertainment apparatus of claim 7, wherein the each of the video content on the wish list is given a priority, and wherein the controller is operable to control the communication interface to download from the digital entertainment server video content on the wish list in accordance with the given priority.

20 9. The portable entertainment apparatus of claim 7, wherein the controller is operable to determine cause the entertainment apparatus to establish a communication link with the digital entertainment server at a predetermined interval.

10. The portable entertainment apparatus of claim 7, wherein the wish list is updated to delete downloaded video content after the video content on the wish list is downloaded to the portable entertainment apparatus.

11. The portable entertainment apparatus of claim 7, wherein the memory further stores
5 a played list having a list of video content that was previously played by the portable entertainment apparatus, and wherein the controller is operable to prevent video content on the played list from being downloaded from the digital entertainment server.

12. The portable entertainment apparatus of claim 7, wherein the controller causes the storage module to delete video content that was previously played.

10 13. The portable entertainment apparatus of claim 12, wherein the video content is deleted from the storage module after a predetermined period of time.

14. The portable entertainment apparatus of claim 12, wherein the video content is deleted from the storage module after the video content is played a predetermined number of instances.

15 15. A portable entertainment apparatus capable of communicating with a digital entertainment server, wherein the digital entertainment server is operable to store video content and a downloadable content list as specified by a user, and wherein the portable entertainment apparatus is operable to store at least part of the video content stored in the digital entertainment server, the portable entertainment apparatus comprising:

20 a communications interface for downloading video content from the digital entertainment server;

a storage module for storing the downloaded video content; and

a controller coupled to and operable to control the operations of the communications interface and the storage module, wherein the controller is operable to control the communication interface to download from the digital entertainment server video content on the downloadable content list.

16. An entertainment system comprising:

a digital entertainment server storing a plurality of video content; and

a portable entertainment apparatus capable of communicating with the digital entertainment server, wherein the portable entertainment apparatus is operable to download and store at least part of the video content stored in the digital entertainment server after the portable entertainment apparatus establishes a communication link with the digital entertainment server.

17. The entertainment system of claim 16, wherein the digital entertainment server comprises:

an input module receiving a multi-channel signal and selecting a first video content of one channel from the multi-channel signal;

an encoder coupled to the input module for receiving the first video content, determining whether the first video content is in analog format, and responsive to the first video content being in analog format, encoding the first video content to a digital format;

a first communications interface for coupling the digital entertainment server to a data communication network, and for receiving a second video content in digital format;

a storage module storing the first and second video content in digital format;

5 a second communications interface for coupling the digital entertainment server to the portable entertainment apparatus; and

a controller coupled to and operable to control the operations of the input module, the encoder, the first and second communications interfaces, and the storage module, wherein the controller is operable to cause the second
10 communications interface to transmit video content to the portable entertainment apparatus responsive to determining that portable entertainment apparatus established a communication link with the digital entertainment server.

18. The entertainment system of claim 17, wherein the digital entertainment server further comprises a transcoder coupled to the controller and to the second communications
15 interface, and wherein the transcoder is operable to modify the encoding rate of the first and second video content.

19. The entertainment system of claim 16, wherein the portable entertainment apparatus comprises:

a communications interface for receiving video content from the digital
20 entertainment server in digital format;

a storage module for storing the received video content; and

a controller coupled to and operable to control the operations of the communications interface and the storage module, wherein the controller is operable to control the communication interface to download at least part of the video content stored in the digital entertainment server after the portable entertainment apparatus
5 establishes a communication link with the digital entertainment server.

20. The entertainment system of claim 19, wherein the portable entertainment apparatus further comprises a decoder for decoding the video content stored in the storage module.

21. The entertainment system of claim 19, wherein the portable entertainment apparatus further comprises a display for displaying the video content stored in the storage module.

10 22. The entertainment system of claim 19, wherein the communications interface is a wireless communication interface connecting the portable entertainment apparatus to the digital entertainment server via a wireless communication network, and at least part of the video content stored in the digital entertainment server is downloaded to the portable entertainment apparatus via the wireless communication network after the portable
15 entertainment apparatus is within a wireless communication range for communicating with the digital entertainment server.

23. The entertainment system of claim 19, wherein the portable entertainment apparatus communicates with the digital entertainment server via a cradle and a cable connecting the cradle to the digital entertainment server, and at least part of the video content stored in the
20 digital entertainment server is downloaded to the portable entertainment apparatus via the

cable and the cradle automatically when the portable entertainment apparatus is coupled to the cradle.

24. In a digital entertainment apparatus that is operable to download at least part of the plurality of video content stored in the digital entertainment server to a portable entertainment apparatus after the portable entertainment apparatus establishes a communication link with the digital entertainment server, wherein the portable entertainment apparatus has a wish list, and wherein the digital entertainment server has an available-content list, a method of synchronizing video content stored in the digital entertainment server with video content stored in the portable entertainment apparatus, the method comprising:

determining whether the portable entertainment apparatus is within synchronization range from the digital entertainment server;

responsive to determining that the portable entertainment apparatus is within synchronization range, receiving the available-content list the digital entertainment server;

comparing the wish list with the available-content list; and

downloading video content found on both the wish list and the available-content list from the digital entertainment server to the portable entertainment apparatus.

25. The method of claim 24, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wireless communication interface

and the portable entertainment apparatus is within synchronization range from the digital entertainment server when the portable entertainment.

26. The method of claim 24, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wired cable, and wherein the
5 portable entertainment apparatus is within synchronization range when the portable entertainment apparatus is coupled to the wired cable.

27. The method of claim 24, wherein the portable entertainment apparatus stores a played list having a list of video content that was previously played by the portable entertainment apparatus, and wherein the video content is downloaded from the digital
10 entertainment server to the portable entertainment apparatus responsive to determining that the video content is not found on the played list.

28. In a portable entertainment apparatus that is operable to download and store at least part of the plurality of video content stored in a digital entertainment server having an available-content list after the portable entertainment apparatus establishes a communication
15 link with the digital entertainment server, a method of synchronizing video content stored in the digital entertainment server with video content stored in the portable entertainment apparatus, the method comprising:

determining whether the portable entertainment apparatus is within
synchronization range from the digital entertainment server;

20 responsive to determining that the portable entertainment apparatus is within synchronization range, receiving the available-content list from the digital entertainment server;

receiving a selection of video content to be downloaded among the video content listed on the available-content list; and

downloading video content from the digital entertainment server to the portable entertainment apparatus.

5 29. The method of claim 28, wherein video content is previously selected by a user.

30. The method of claim 28, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wireless communication interface and the portable entertainment server after the portable entertainment apparatus is within a wireless communication range for communicating with the digital entertainment server.

10 31. The method of claim 28, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wired cable, and wherein the portable entertainment apparatus is within synchronization range for communicating with the digital entertainment server when the portable entertainment apparatus is coupled to the wired cable.

15 32. The method of claim 28, wherein the portable entertainment apparatus stores a played list having a list of video content that was previously played, and wherein the video content is downloaded to the portable entertainment apparatus responsive to determining that the video content is not found on the played list.

33. In an entertainment system including a digital entertainment server and a portable
20 entertainment apparatus for downloading and storing at least part of the plurality of video content stored in the digital entertainment server after the portable entertainment apparatus

establishes a communication link with the digital entertainment server, a method of synchronizing video content stored in the digital entertainment server and the portable entertainment apparatus, the method comprising:

5 receiving at the digital entertainment server a user selection of video content to be downloaded from the digital entertainment server to the portable entertainment apparatus;

determining whether the portable entertainment apparatus is within synchronization range from the digital entertainment server;

10 responsive to determining that the portable entertainment apparatus is within synchronization range, downloading video content from the digital entertainment server to the portable entertainment apparatus according to the user selection.

34. The method of claim 33, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wireless communication interface, and wherein the portable entertainment apparatus is within synchronization range from the digital entertainment server when the portable entertainment apparatus is within a wireless communication range for communicating with the digital entertainment server.

35. The method of claim 28, wherein the portable entertainment apparatus communicates with the digital entertainment server via a wired cable, and wherein the portable entertainment apparatus is within synchronization range from the digital entertainment server when the portable entertainment apparatus is coupled to the wired cable.

36. A portable entertainment apparatus for use in conjunction with an external video device including a display module and means for inputting commands, the portable entertainment apparatus comprising:

disk-based storage media for storing video content in digital format;

5 a decoder module for decoding the video content stored in the storage module;

a display module for displaying the decoded video content;

a communications interface for receiving commands from the external device; and

10 a controller coupled to and operable to control the operations of the disk-based storage media, the display module, decoder module, and the communications interface, wherein the controller is operable to cause (i) the decoder module to decode the video content, and (ii) the display module to display the decoded video content in response to a command received from the external device via the
15 communication interface.

37. The portable entertainment apparatus of claim 36, wherein the display module comprises a liquid crystal display.

38. The portable entertainment apparatus of claim 36, further comprising a speaker for producing sound corresponding to the video content displayed on the display module.

20 39. A portable entertainment apparatus for playing video content, the portable entertainment apparatus comprising:

(a) a dedicated video communications interface for receiving video content and data associated with the video content;

(b) an encoder module for encoding the received video content in digital format;

5 (c) a storage module for storing the encoded video content;

(d) a decoder module for decoding the encoded video content stored in the storage module;

(e) a display module for displaying the decoded video content;

10 (f) input keys for inputting commands to the portable entertainment apparatus, wherein the input keys including at least a play button for playing video content, a stop button for stopping playing video content, and a menu button for displaying a list of video content stored in the storage module;

15 (g) a memory module for storing graphical user interface software, wherein the graphical user interface software is configured to display on the display module, in response to activation of the menu button, the list of video content stored in the storage module; and

20 (h) a processor module for running the graphical user interface software, wherein the processor module is operable to cause (i) the decoder module to decode at least part of the video content stored in the storage module, (ii) the display module to display the decoded video content in response to activation of the play button, and (iii) the display module to stop displaying the video content in response to activation of the stop button.

40. The portable entertainment apparatus of claim 39, wherein at least (a)-(d) and (f)-(g) of the portable entertainment apparatus are integrated into a housing.

41. The portable entertainment apparatus of claim 39, wherein the display module comprises a liquid crystal display.

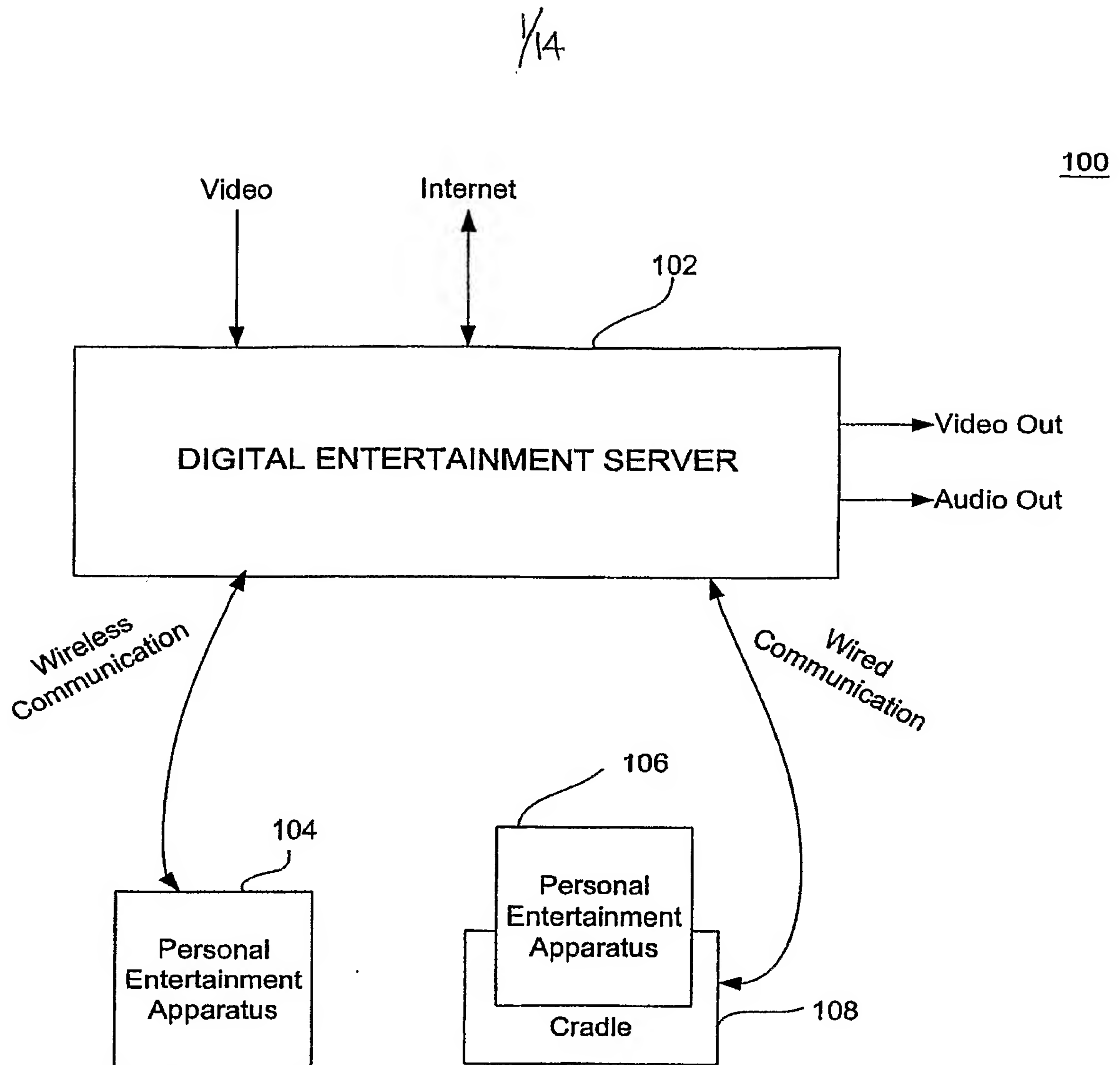


FIG. 1

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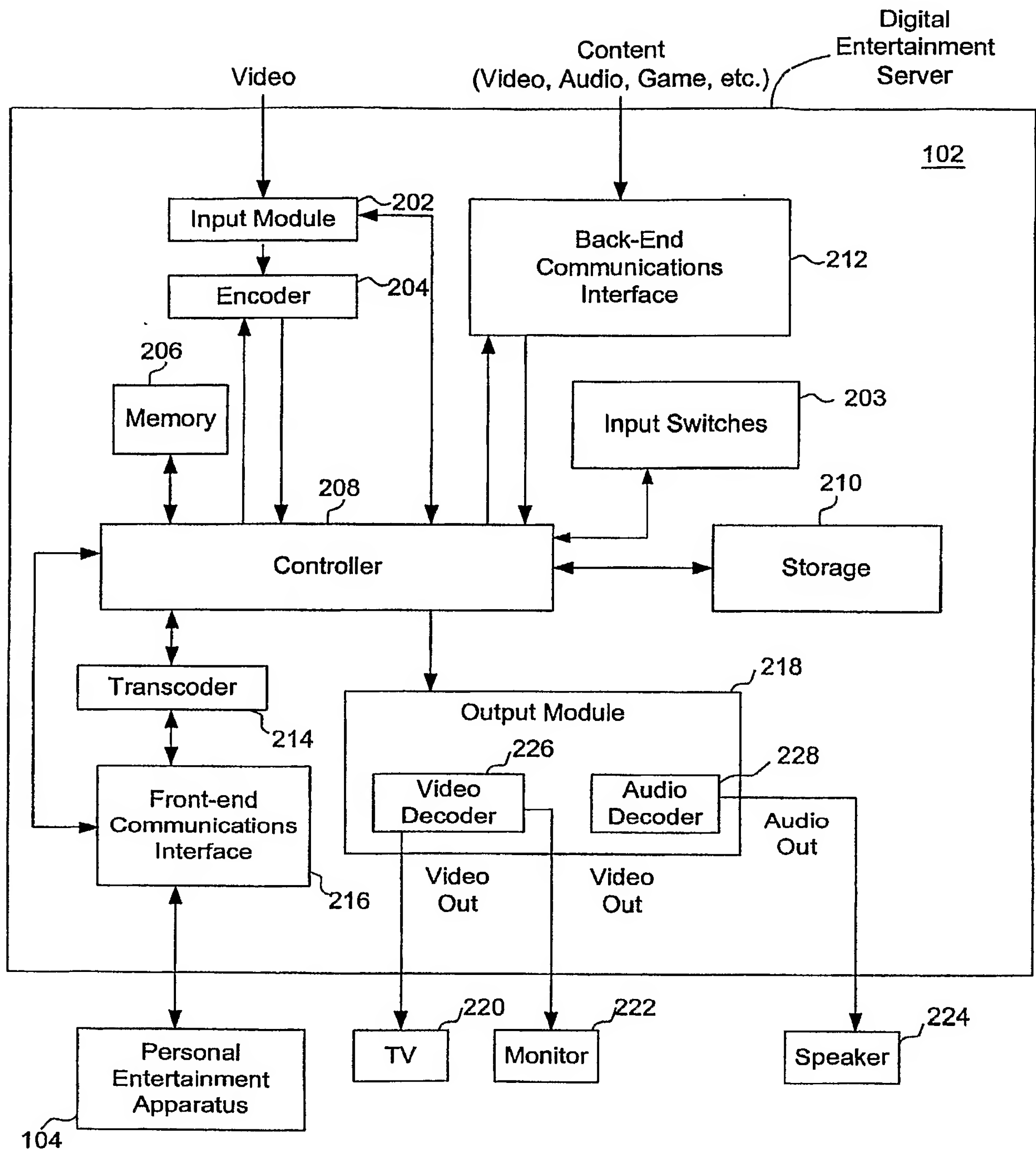


FIG. 2

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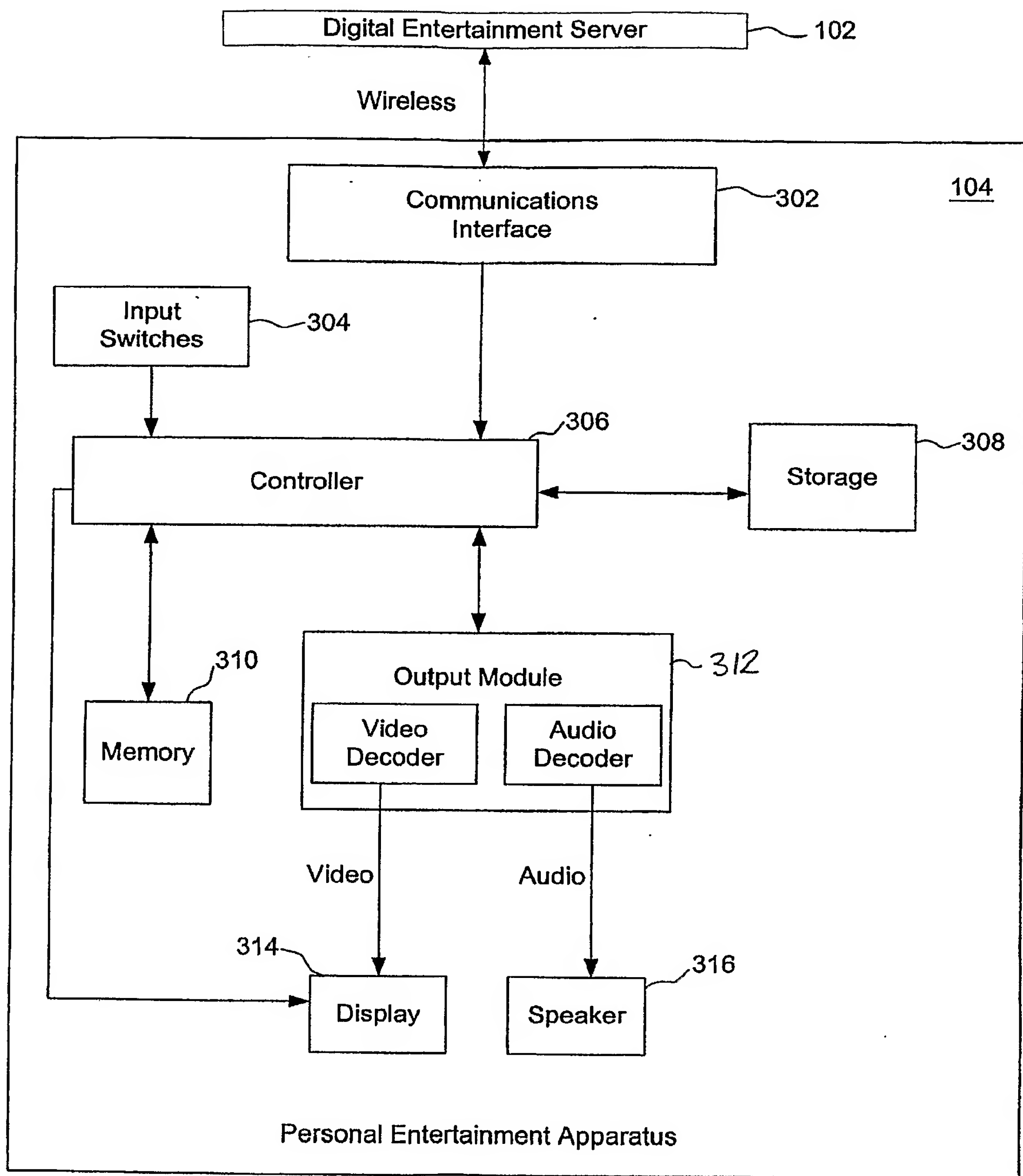


FIG. 3A

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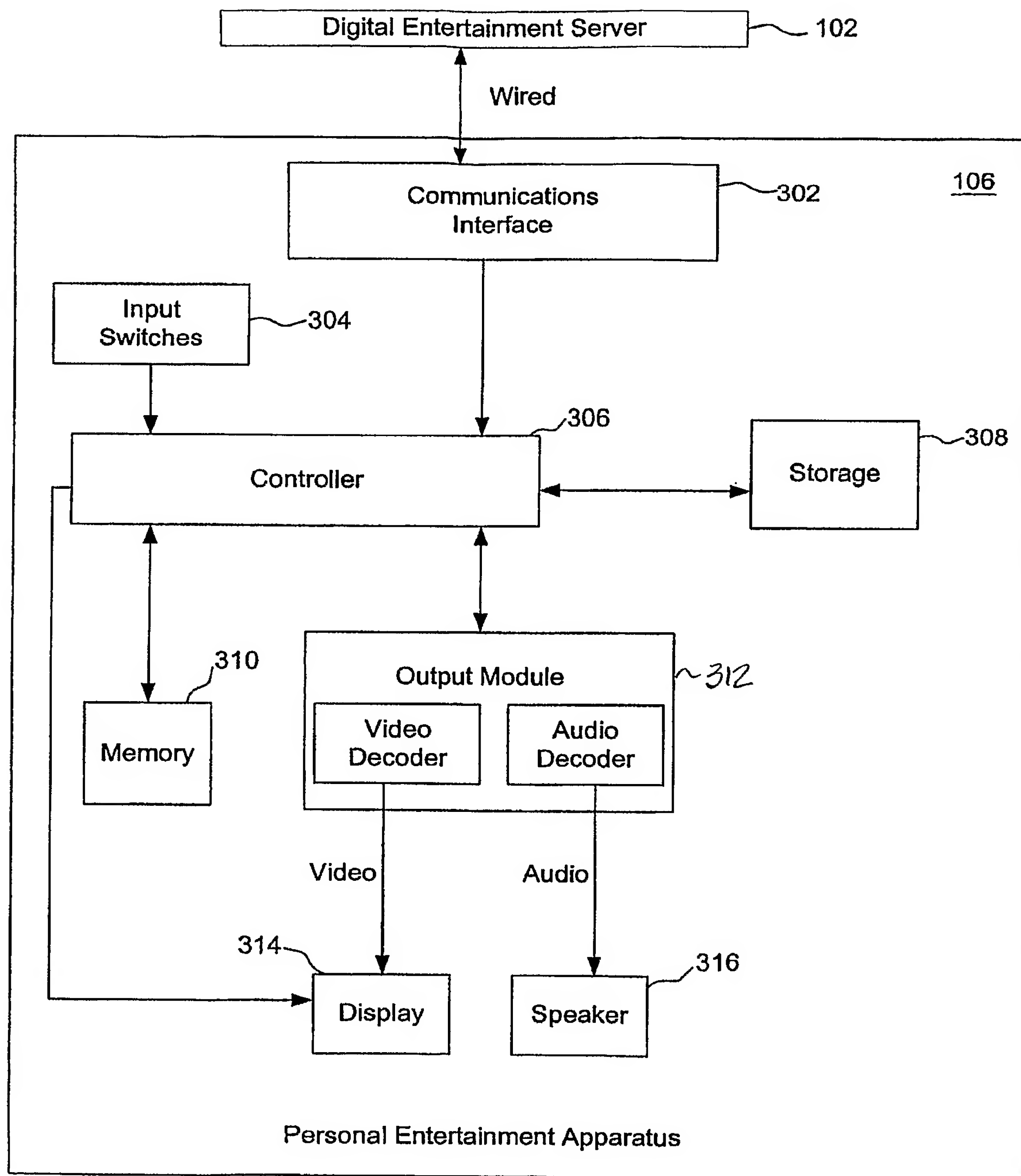


FIG. 3B

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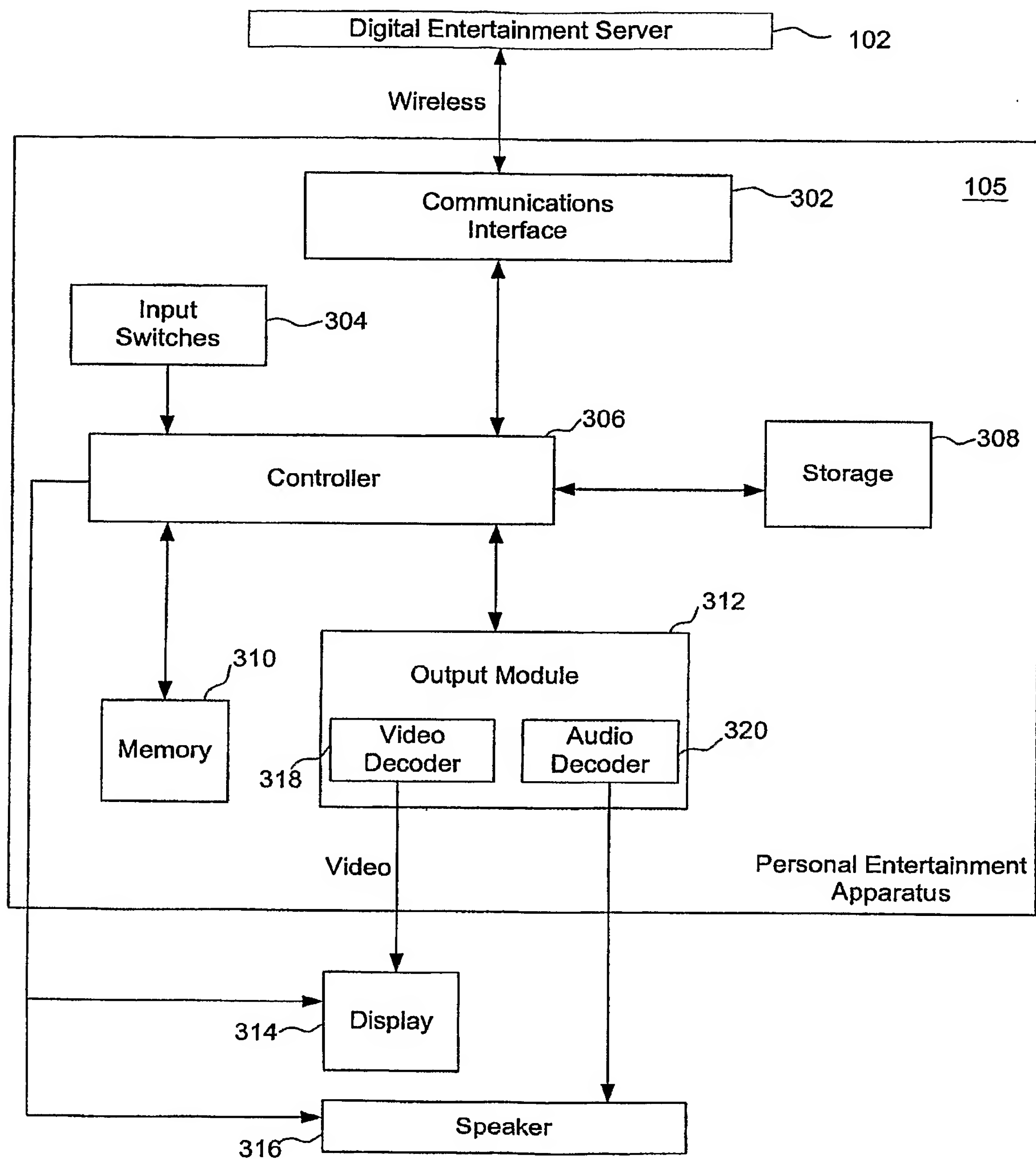


FIG. 3C

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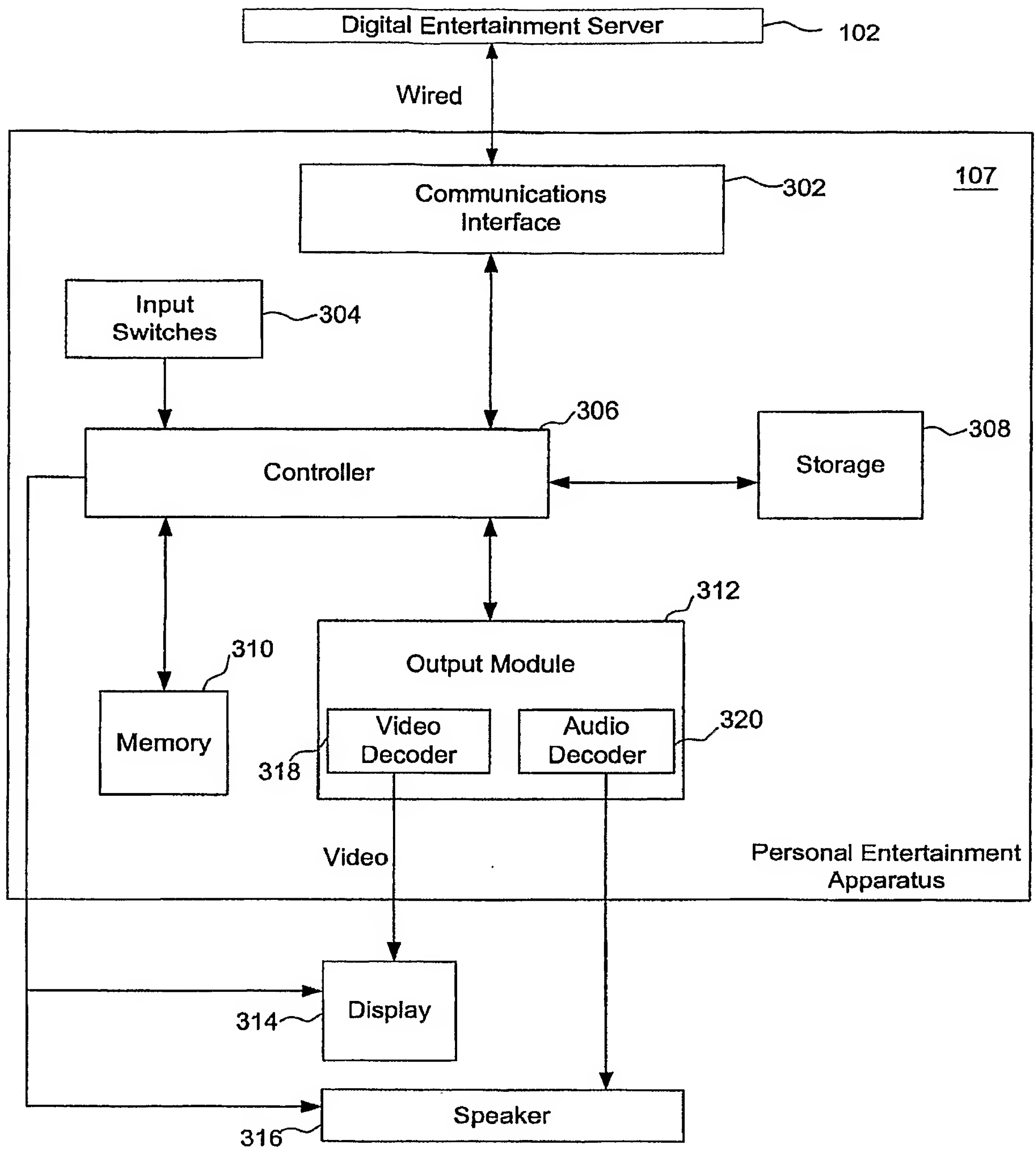


FIG. 3D

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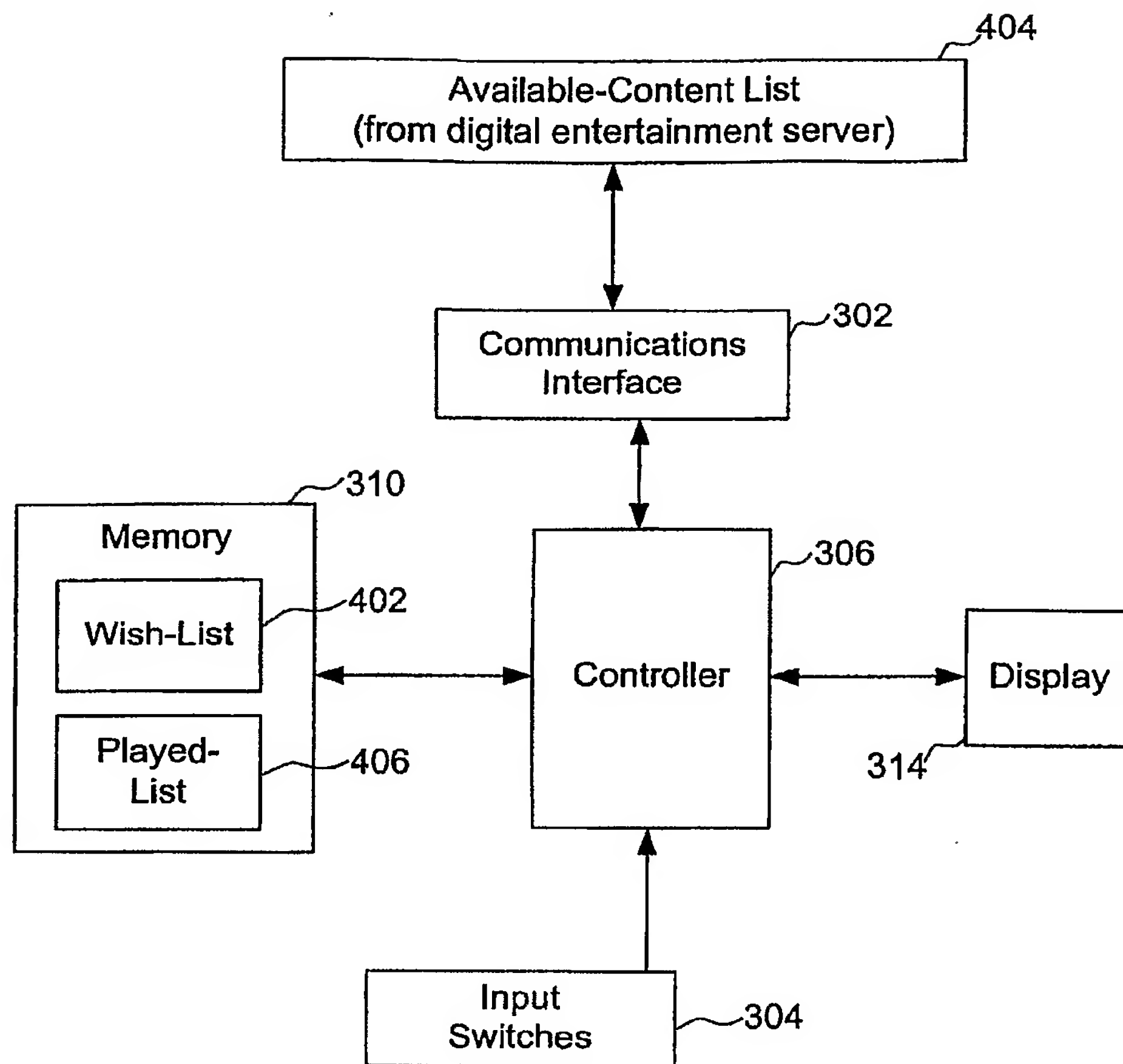


FIG. 4

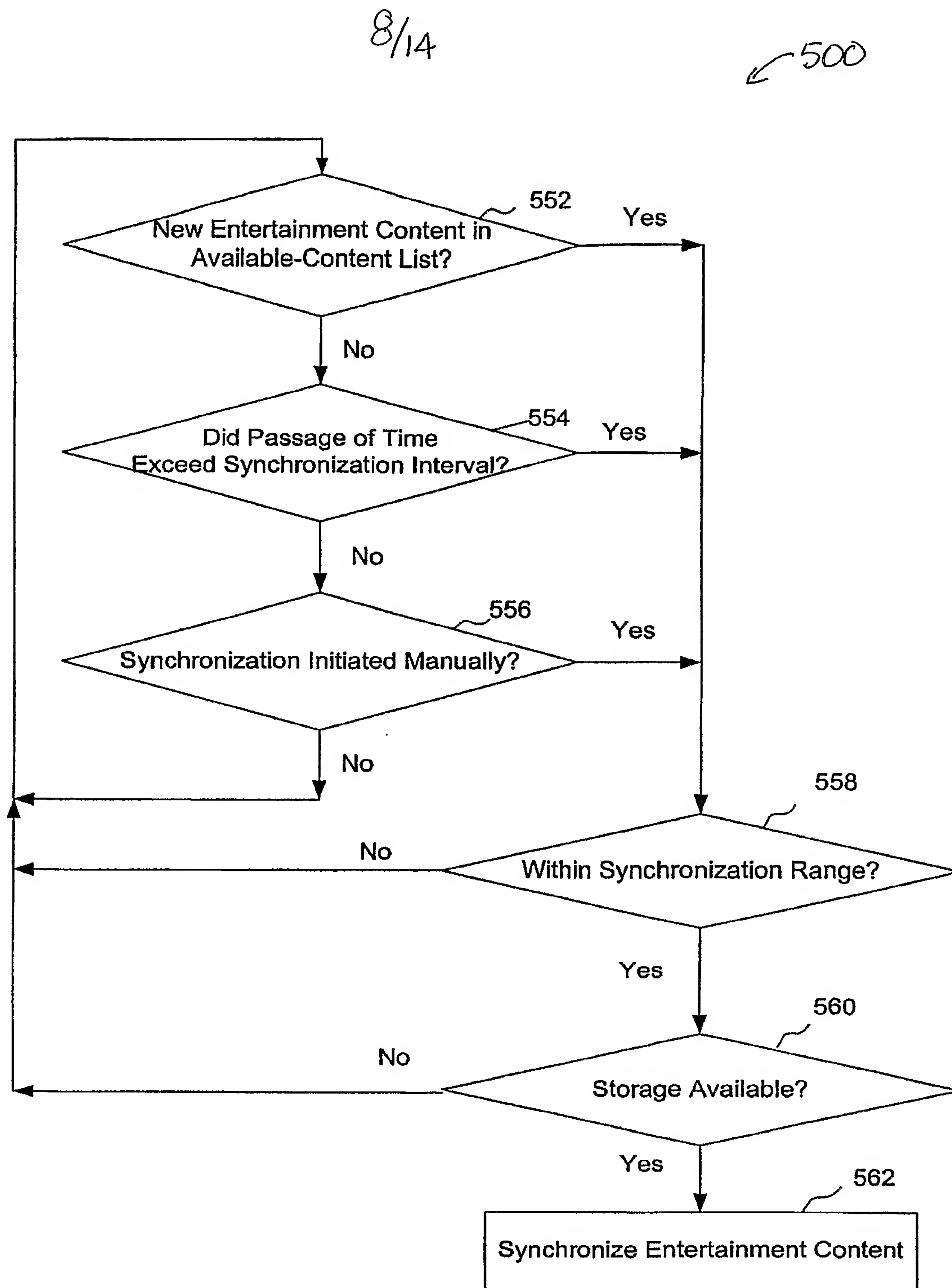


FIG. 5A

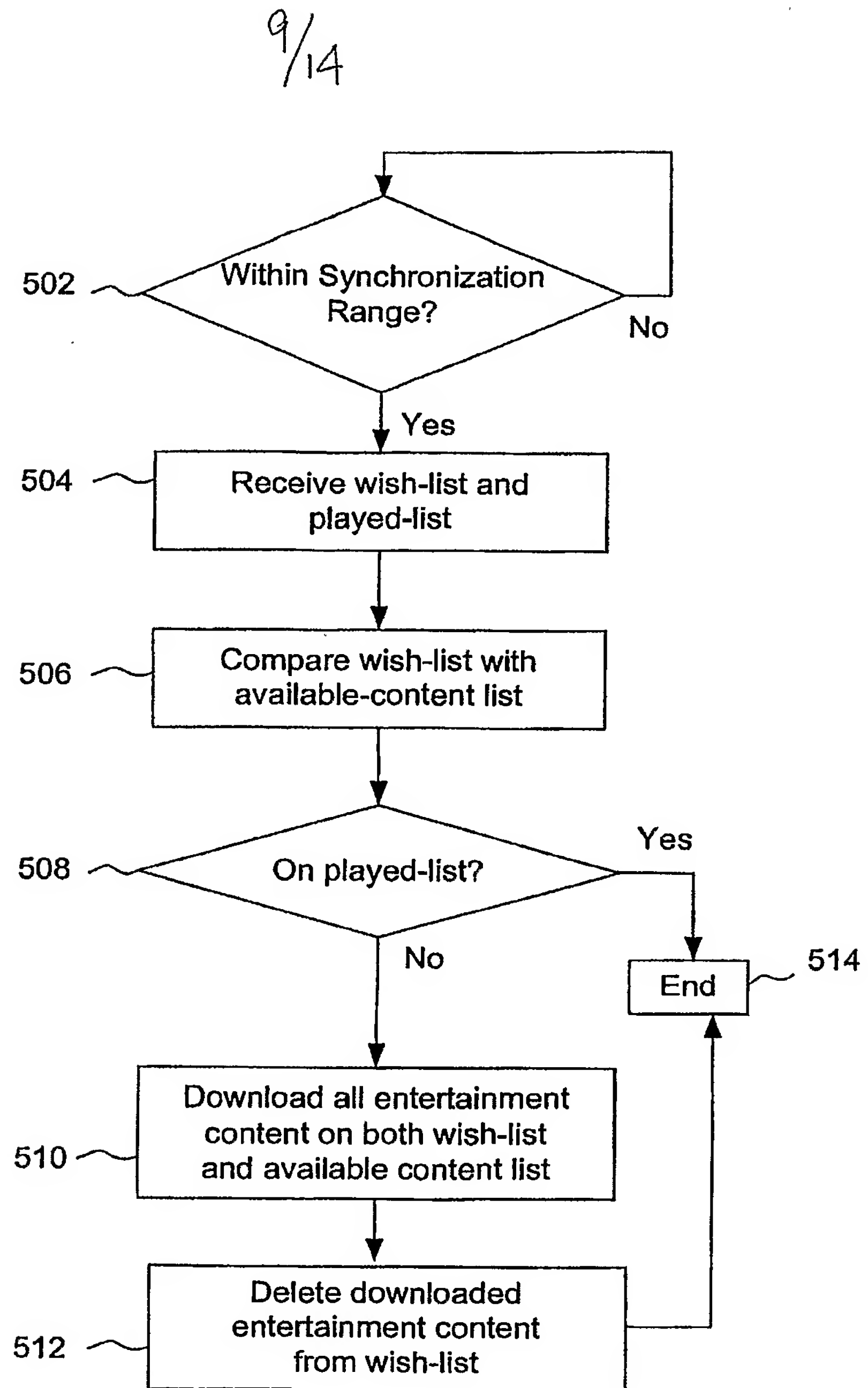


FIG. 5B

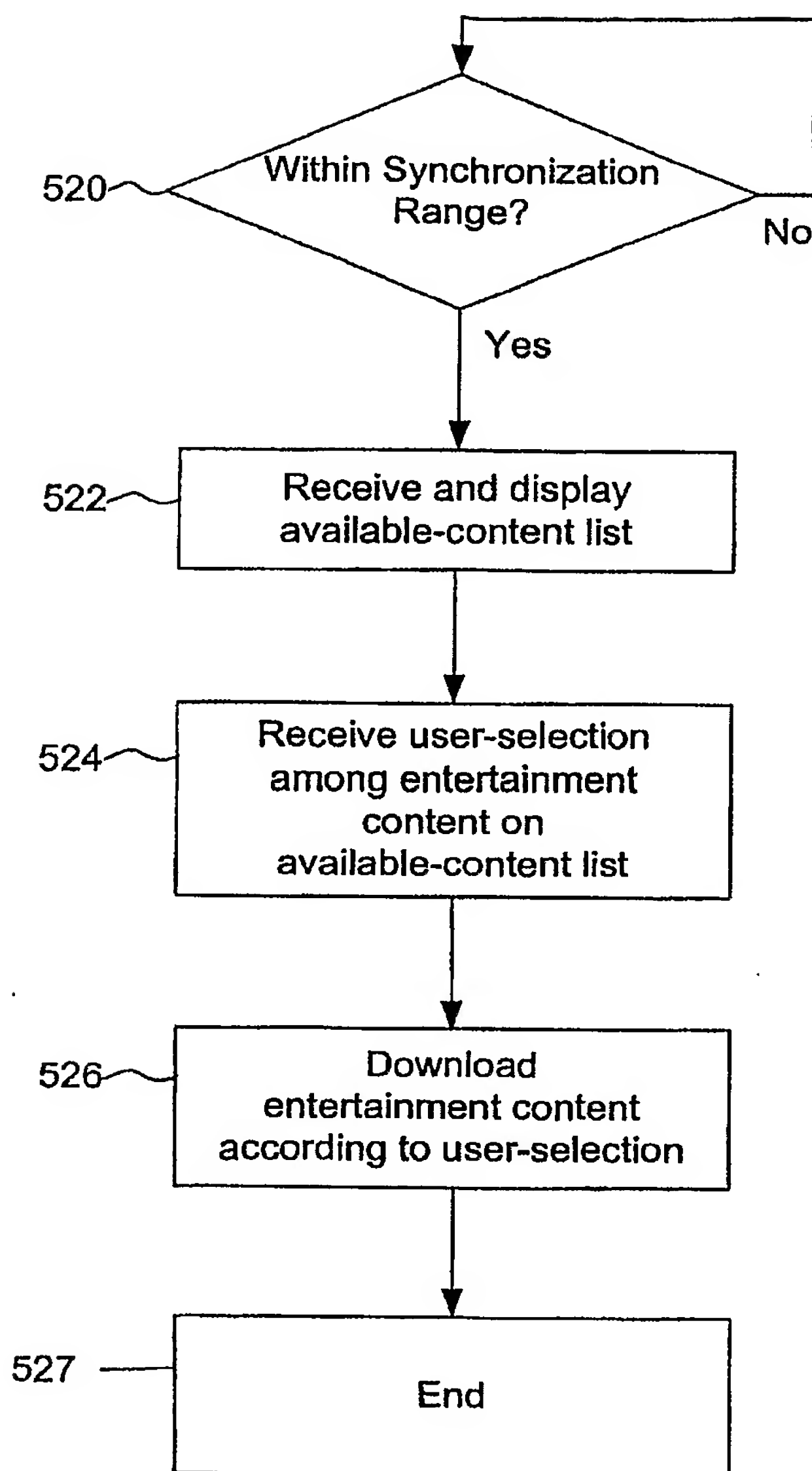


FIG. 5C

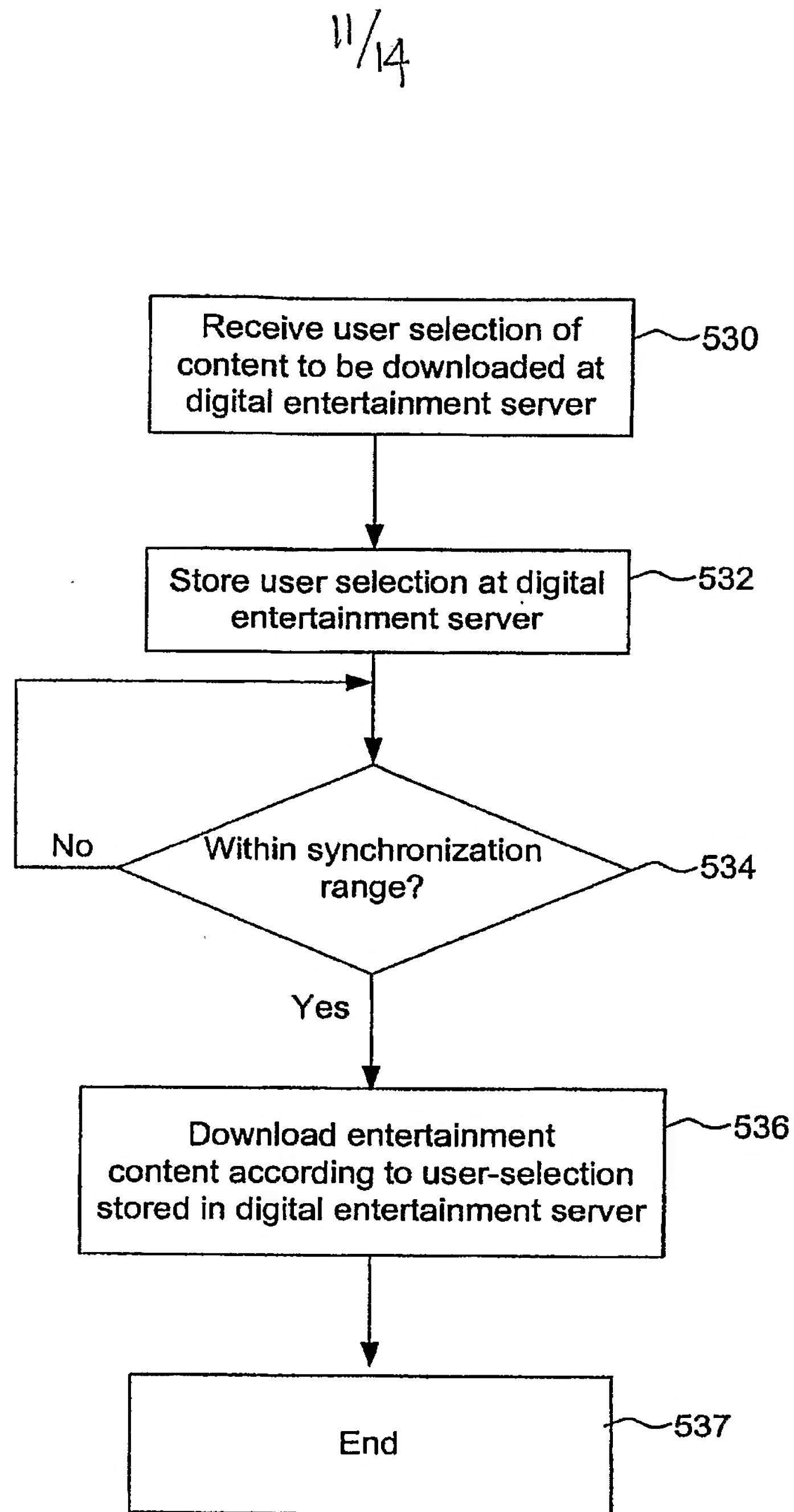


FIG. 5D

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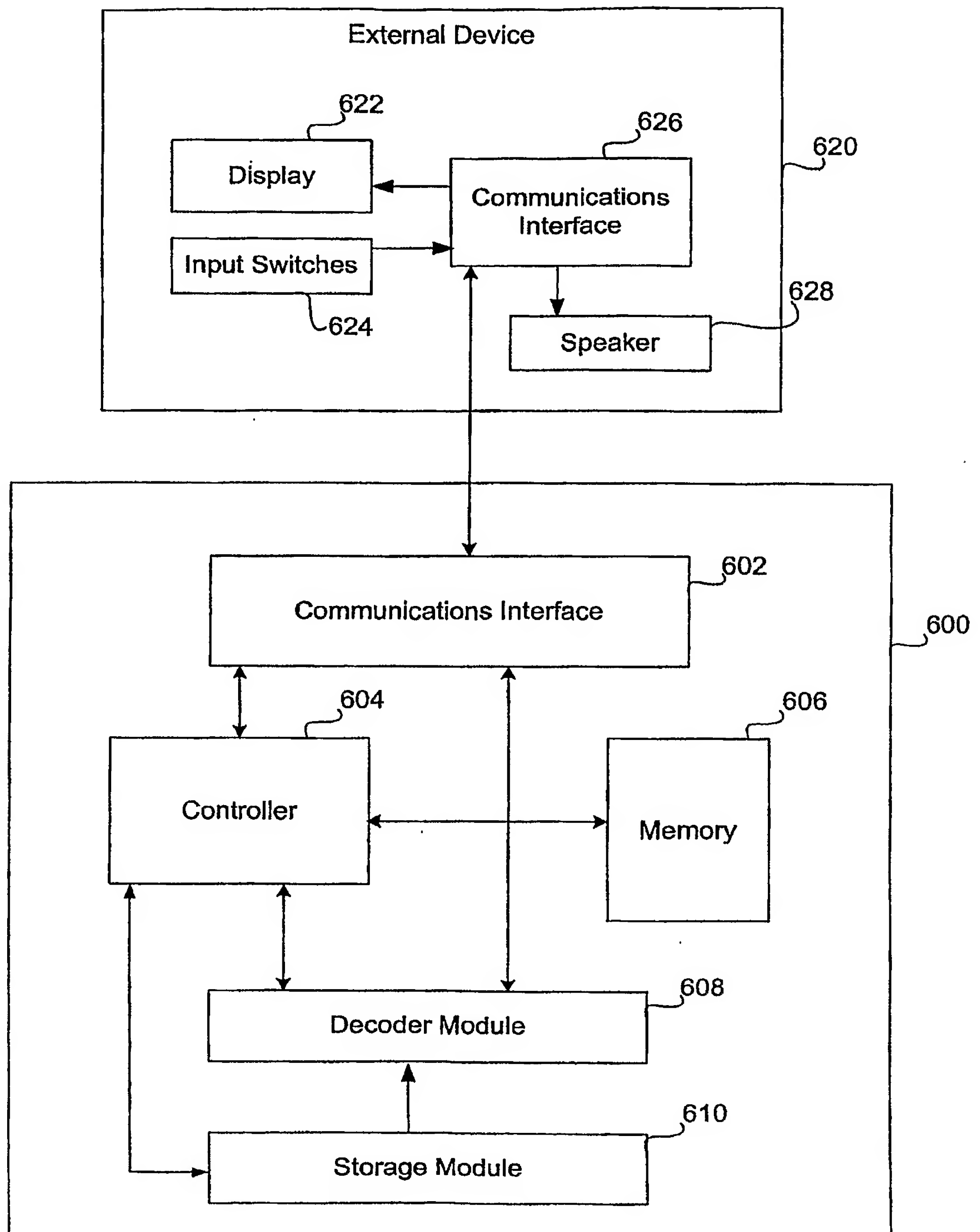


FIG. 6A

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14

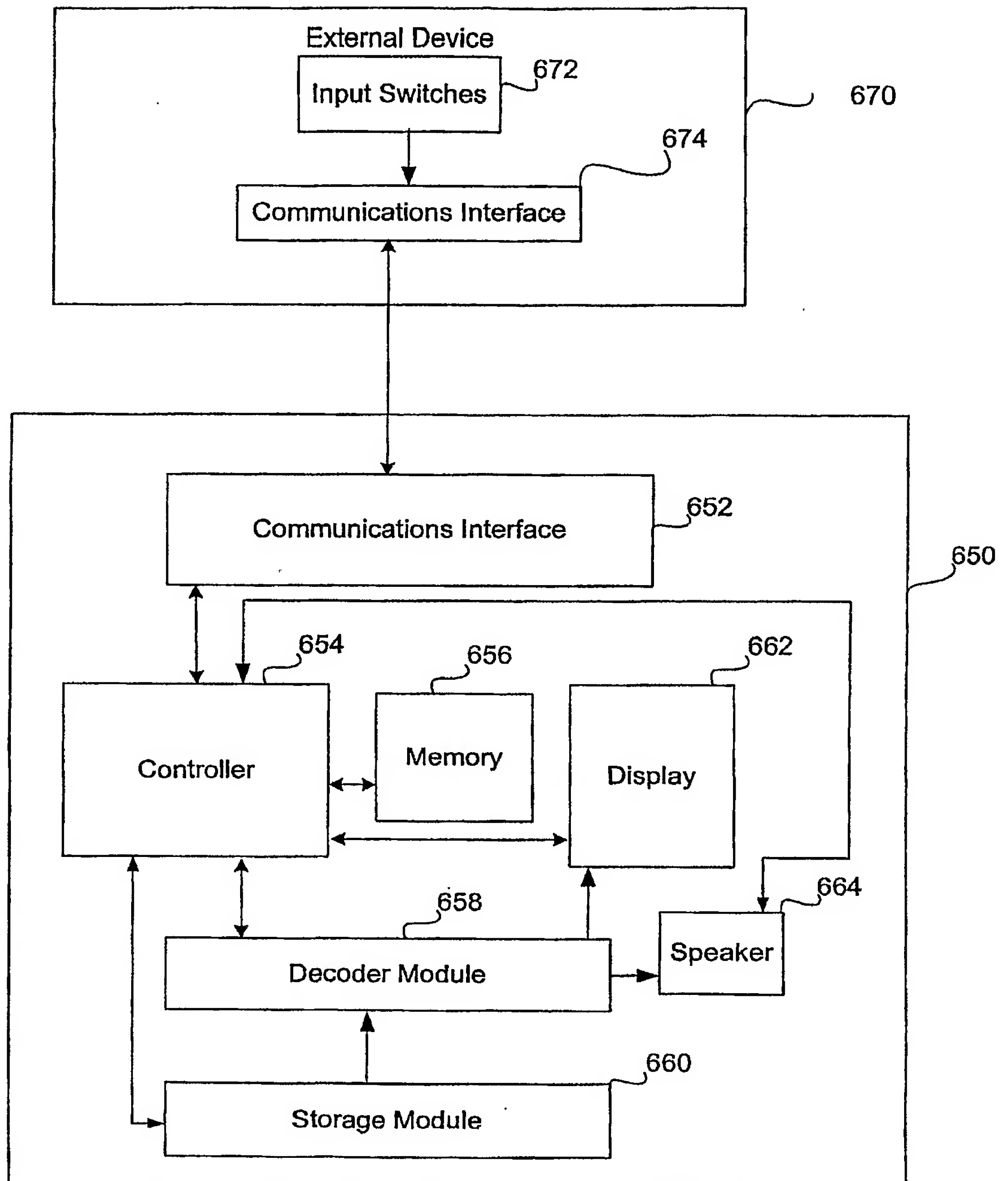


FIG. 6B

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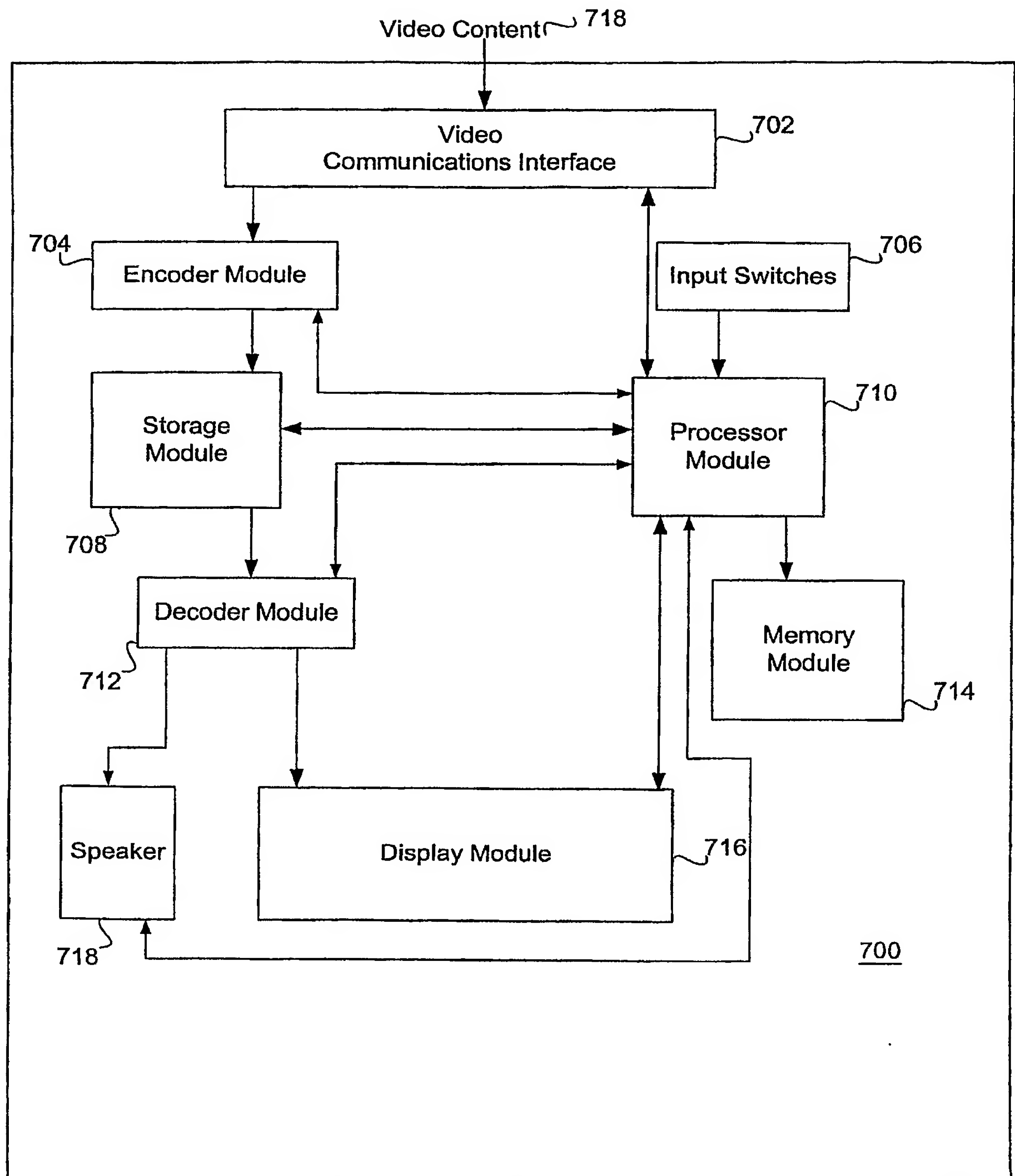


FIG. 7

INTERNATIONAL SEARCH REPORT

'US2004/029060

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G11B19/00 H04N5/76 H04N7/173 H04L29/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G11B H04N H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/164156 A1 (BILBREY BRETT) 7 November 2002 (2002-11-07)	1-3, 5-7, 15-21, 23, 36-41
Y	the whole document	8-14
X	PATENT ABSTRACTS OF JAPAN vol. 2002, no. 11, 6 November 2002 (2002-11-06) & JP 2002 202831 A (MATSUSHITA ELECTRIC IND CO LTD), 19 July 2002 (2002-07-19) abstract	1-4, 6, 7, 15, 16, 19-23, 36-41
X	US 5 861 906 A (DUNN MATTHEW W ET AL) 19 January 1999 (1999-01-19)	24-35
Y	the whole document	8-14
X	US 2002/062357 A1 (SRINIVASAN THIRU) 23 May 2002 (2002-05-23) the whole document	24-35

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

19 January 2005

Date of mailing of the international search report

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Information on patent family members

US2004/029060

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002164156 A1	07-11-2002	NONE	
JP 2002202831 A	19-07-2002	NONE	
US 5861906 A	19-01-1999	US 6571390 B1	27-05-2003
		US 2003154486 A1	14-08-2003
US 2002062357 A1	23-05-2002	NONE	